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The Tools of Management

H. LEADBEATER, Property Services Agency, DOE

The article that follows is the second of a series of three based on talks given at a forum on accountable management held in January this year. The first—*Making Room for Managers in Whitehall* by Sir Derek Rayner—appeared in the May edition. In this heavily abridged version of his original talk, Mr. Howell Leadbeater, Controller of Supplies in the Property Services Agency, discusses the various tools of management which are relevant to the setting up of units of accountable management in government, with particular reference to the setting up of his own Division.—*Editor.*

Introduction

In these days when theories, concepts and techniques of management proliferate, it would take a long time to discuss in relatively simple terms the rapidly expanding subject of 'Tools of Management'. But, here we are discussing accountable management in government and I am, therefore, going to examine only those tools of management which seem particularly relevant to the setting up of units of accountable management in government and to managing those units efficiently when they have been set up. And you will make allowances that I am going to discuss tools of management in the particular context of setting up Supplies Division as an accountable unit of management and that consequently I shall have to refer a great deal to Supplies Division.

Essentials of management

Before I go on to deal with tools of management let us stop to think what they are for. What are the larger purposes of management which they ought to serve? What are the basic essentials of good management? What is management really about?

I believe the first thing one needs to run an organization is a *corporate strategy*. Corporate strategy is knowing in a corporate sense what it is you ought to be doing and working out a plan for doing it; corporate strategy is knowing where it is you want to go, and mapping out a route for getting there; corporate strategy is knowing what it is you want to be and working out a plan for being it. Corporate strategy breaks down, therefore, into aims and objectives. Aims, says a recently issued CSD pamphlet,* are the purposes for which any form of organized activity exists. They describe those purposes, but not the extent to which it is sought to achieve them in any given period of time. Objectives are specific and wherever possible quantifiable targets to be achieved or bettered within a stated period of time.

An inter-departmental committee known as WPAMS—the Working

* *The Meaning of Some Management Terms.* Supplement to the August 1972 edition of the *O & M Bulletin.*

Party on Accountable Management for Supplies—recently recommended that the primary aim of Supplies Division should be to meet the approved needs of Government Departments for certain supplies and services and to undertake the procurement and supply of those goods and services efficiently and economically. Not much there you might say in terms of corporate strategy. But what does efficiently and economically mean? Simply that the quality of our goods and services should be good for the price government are prepared to pay; that our prices in real terms are competitive with industry; that our supply should not be less prompt or regular than the better alternative suppliers; and that our overhead operating costs should compare *mutatis mutandis* with the more efficient organizations operating in this field.

With these considerations in mind we drew up some four years ago a corporate strategy for Supplies Division which laid down specific objectives for a programme of standardization and rationalization—for drastic reduction of the variety of goods we supply, for having larger contracts, longer contracts, fewer contracts, for a greater use of direct delivery from factory to customer, for reducing stocks in store, for reducing stores, for reducing vehicle types, for developing a sophisticated computer system. Since then the volume of Supplies Division activities has gone up from £50 million to something near £120 million. More than half of this increase is in real terms. Yet in that period we have reduced the catalogue list by over 1,000 items, we have closed down 15 stores, cut down storage space by 1 million square feet and reduced the staff by almost 500. We have thereby reduced our overhead costs by £3 million a year. This is the real meaty stuff of a meaningful corporate strategy.

It is all very well drawing up a corporate strategy with a detailed statement of objectives. But it is another thing to implement them. In a large organization the real process of implementing strategy or top management directives has to take place at working level on the initiative of a considerable number of relatively junior managers. How does one communicate the philosophy and strategy of higher management to junior staff and how does one motivate the staff to carry out the strategy?

One of the main tasks of top management is to provide the basic conditions within which *communication* and *motivation* can successfully take place—mainly common experience between managers and managed and the opportunity of finding self-expression and personal fulfilment in work through involvement and participation in the running of the organization. There are two further concepts of exceptional value in this respect which I do not propose to deal with here—career structure and career development.

All organizations need a *management system* for directing, controlling, evaluating its operations, activities and performance. The system must be based on adequate information, numerical as much as possible, for intelligent decision taking and for running the organization

efficiently. There is no lack of tools for this, not all of them valuable.

These then are the main purposes which tools of management ought to serve. I can now turn to the real subject-matter.

The tools of management

Identity. I am not quite certain whether the first item under this heading is appropriate to it—the creation of a sense of identity. One of the top priorities for any head of a large organization is to create a representative image for his organization with which the staff both can and want to identify themselves. Staff should feel proud of the organization they work for, of the value of the work it does, of the way it carries it out, of its standing with the outside world. Top management must not only ensure that an organization is efficient, but demonstrate that efficiency in all kinds of ways to the staff and to the outside world.

Corporate management. Communication and motivation require, as I said earlier, common experience and involvement. And just as well. For large organizations are nowadays far too complex for semi-divine persons to run them as a one-man band. Corporate management is the thing. But corporate management is much more than a board of directors with a Chairman or Managing Director. In Supplies Division my Assistant Controllers and I form a board, meeting formally and regularly, to direct the running of the Division. Each Assistant Controller has regular meetings with his managers to run their branches, but also to go in greater depth into some of the things raised at the board meetings. Each manager has regular meetings with his submanagers. In this kind of way the considerations involved in running the organization, the problems of management, how best to deal with them percolate far down the organization—and, of course, back up again. People down the line know what top management is thinking and top management know what people down the line are thinking.

Management information. Any organization aspiring to an efficient performance must develop a corpus of management information as a basic tool of management. At pages 131 and 132 are a few simple histograms covering the purchasing activities of Supplies Division. With charts of this kind we can see at a glance if the policies we have instituted for more efficient purchasing are in fact being implemented and if they are leading to the staff savings and reduction of overheads. We have similar charts supported by much more detailed information for all the activities of the Division. But it is not enough to have a sophisticated management information system. There must be systematic use of it. In Supplies Division the Management Board has an annual programme for detailed discussion of the management information, a different block of it being taken each month. The information is broken down between management units and each manager discusses that part of the management information relevant to him with his submanagers. The management information system should be closely

interwoven with a management by objectives scheme and, of course, the management accounting system is also part of the management information system. It is only by the formalized and systematic utilization of the management information system in this way that it becomes a real tool of management.

Management by objectives. Probably the best-known tool of management for creating the common experience within which communication and motivation can take place is management by objectives—a system for breaking down the objectives set out in the corporate strategy to individual managers at all levels in the organization. But it must be an agreed breakdown arrived at by discussion between each manager and each of his sub-managers. The process requires that every member of the staff above clerical level should know and understand the corporate strategy. What part of it he is responsible for; and that he should agree with the manager above him a programme of specific achievement against those objectives expressed in precise quantitative terms against specific datelines.

He must periodically report progress. He must be given a fresh set of objectives from time to time. And there must be a periodic recycling of the whole MbO scheme to coincide preferably with a new corporate strategy. MbO is a scheme *par excellence* for providing common ground between manager and sub-manager and for ensuring the participation and involvement of even relatively junior staff in the implementation of corporate strategy.

Computer use. Where an organization is both large and complex a computer is invaluable for doing routine work which would otherwise require considerable numbers of clerical staff. It is also invaluable for providing management information of various kinds which could not otherwise be provided because of the staff that would have been required to provide it. But a computer is much more than an instrument for displacing staff engaged on routine work. For instance, we are currently programming a newly installed computer on the basis that requisitioning officers throughout the country and also at headquarters will place their demands through data links direct on the computer for simultaneous conversion through other data links at stores themselves or alternatively converted at the computer into orders on manufacturers against existing contracts. We are arranging for the paper prepared by the client to be in a form which can be used for computers without intermediate translation by our staff.

With a good many other detailed refinements which I will not elaborate on here, we expect all this to produce a much quicker and more efficient system of supply which should result in a more rapid turnover of stock, much better provisioning and forecasting systems and considerably lower stock holdings overall. It will also be indispensible for processing data for our management accounting system. In other words, the computer is much more than a machine for dis-

placing clerical staff engaged on routine tasks. It should be a creative tool of imaginative management.

Management accounting. In 1968 the Bellinger Committee installed management and accounting experts from Shell and Unilever into Supplies Division for some seven months to report how the Division could be run more efficiently. Their final report was highly complimentary and contained only one recommendation of real substance—that we should set up a *management accounting system.*

A management accounting system:

(*a*) Breaks down into sub-units the operations of an organization by activity, service, commodity or client.
(*b*) Brings together the total costs—direct and indirect—of running each sub-unit.
(*c*) Relates that cost to the total income earned or the total value of activities carried out by that sub-unit.
(*d*) Puts a manager in charge of each sub-unit who is made answerable for performance in relation to the resources he deploys.
(*e*) Brings together at various levels the grouped costs of these sub-units resulting finally in performance figures for the whole organization.

The *structure of the management accounts* for Supplies Division is based on a framework of 70 budget centres covering discrete units of the organization at SEO or HEO and equivalent level, e.g. a purchasing group, a stores superintendent or a workshop manager. Each budget centre serves as a collecting point for: (*a*) the direct costs of the budget centre itself, such as the salaries and expenses of the people working in it, superannuation, accommodation; (*b*) the direct costs of services provided to it by other budget centres within Supplies Division, e.g. some commodity budget centres will be making use of stores or transport services and they will be charged for these services by the budget centres accountable for them; and (*c*) its share of the costs of Common Services provided externally by DOE or by other Government Departments.

Above this layer of 70 budget centres is a tier of 20 trading accounts. It is at trading account level not at budget centre that expenditure and income are brought together under the management accounting system we are installing in the Division. Each budget centre ultimately charges on its costs to a trading account, but it may do this through another budget centre when it provides a service as is often the case, not to an outside client but to another budget centre. The trading accounts are, therefore, the ultimate repository for all the Division's costs and the collecting points for revenues earned from customers. The differences between costs and revenues represent, of course, profit or loss. The 20 trading accounts will be grouped and summarized in four profit and loss accounts, each the responsibility of an assistant controller,

leaving the Controller to bring together the total accounts for the whole Division into a divisional trading account and balance sheet.

It will be appreciated that a management accounting system requires the accounts of the organization to be concerned not solely with the flow of cash between 1st April and 31st March inclusive of any financial year but also with movements of capital value. If a trader buys or sells on credit, holds stock, owns premises or plant then there are liabilities, or assets, or capital charges to be taken into account as well as cash flow. This means '*accrual*' *accounting*.

With accrual accounting, trading accounts give a comprehensive view of the operations of the undertaking, the efficiency with which they have been carried out and the changes which have resulted in the value of the concern.

As a tool of management, perhaps the most important aspect of management accounting is *budgeting*. Top management will have to draw up a plan for the forthcoming year based on forward projection of likely performance. Sales volumes and revenues as well as the costs associated with them will have to be planned for 20 different trading accounts, each representing a group of commodities or services. The costs in turn will have to be related to 70 budget centres. The forward planning will have to take into account the desirability of ensuring that revenue exceeds total cost by at least a sum which will show a return on capital.

I have described how the management accounting system for Supplies is to be shaped. *What do we expect to gain from it?* Firstly, it provides key quantified information for the efficient management of the agency. It is a basic but comprehensive system of managerial control—we shall see in precise quantitative terms the performance of sub-units and managers. We shall have to plan the future more rigorously and take steps to ensure that achievement matches plan. It involves a large number of managers and sub-managers that I mentioned earlier. It motivates managers by placing on them a clearly defined responsibility for which they will be held accountable. And the whole management accounting system will be geared to the corporate strategy. A management accounting system therefore serves all three of the essentials of management which I have mentioned at the beginning.

Trading fund. Those of you who are familiar with the artificial difficulties which net vote accounting creates will understand we have no hesitation in accepting as a financing alternative the tender mercies of a trading fund. Instead of relying on the annual authority of Estimates and the Appropriation Act for its expenditure, an accountable unit of management will have a continuing specific statutory authority to operate a trading fund. In general it would meet its outgoing from its receipts: it would pay and be paid for all goods and services which it received and provided. It would have an initial capital debt to the Government as a whole equal to the current value of its assets, including

fixed assets, stocks and other working capital at the time it was set up. It would have to service that debt from its earnings. It would borrow from the Government to meet any need to increase its capital in so far as that could not be financed from retained surpluses.

The initial assets of an organization financed from a trading fund would have to include working capital to cover business already in the pipeline and short-term fluctuations during the year in its cash position. Suitable arrangements would be made, however, with the Exchequer for investing short-term cash surpluses and, if necessary, for short-term borrowing. The initial debt would be primarily in the form of fixed interest debt. It would ultimately be for decision by the parent department (if any) and the Treasury how far any surplus earned in a particular year over and above that required to pay interest would be used to pay off debt and how far it would be retained by the organization to meet its needs for new capital.

A trading fund will more than anything bring home to the organization, Government Departments and Parliament the new philosophy of government embodied in the idea of accountable units of management —that here is an organization engaged in a quasi-commercial activity to be controlled and judged as such, and for which the traditional vote accounting yardstick of comparing out-turn on expenditure and receipts with Estimates is irrelevant. It will be difficult enough for the traditional control apparatus of Whitehall to adjust itself to these new forms of public organizations operating on a trading fund. Were they to remain on vote accounting I doubt whether the mental adjustments would ever be made.

Pricing policy. Although I have been describing Supplies Division activities as quasi-commercial they differ on fundamental points to those of outside business organizations:

(*a*) Government Departments are tied customers of Supplies Division.
(*b*) Supplies Division is also tied to its customers. It cannot choose whom to supply or what to supply.
(*c*) The existence of approved standards with scales of entitlement for the service as a whole coupled with bulk buying have at least in some areas given the Division what economists would call 'monopoly' powers.

These considerations make it inappropriate to operate full market pricing in an accountable Supplies Division; that is, to charge the customer the price that the market would bear. The profit on turnover or return on capital that Supplies Division would make on full market pricing would not in the circumstances I have described necessarily be a real measure of the efficiency of the Division. We have to consider, therefore, approaches to pricing including trade margin pricing, differential pricing and cost pricing.

After long discussions with our consultant accountants and after

further examination in depth by WPAMS it was decided that we should operate forecast cost pricing: the Division would charge prices based on its total costs, including the cost of capital. We shall quote firm prices for six months ahead even though we may not have firm figures of cost from manufacturers, distributors, or even for some of our own overheads.

If it is not to make a loss Supplies Division will have to be on its toes to operate forecast cost pricing. It will have to go very carefully into costs of production and distribution as well as its own overhead costs. The economies deriving from large-scale centralized procurement will under forecast cost pricing be passed on to Government Departments and reflected in Votes, rather than accrue to the sub-department. Cost pricing will make clear within government the real cost of goods and services and not mask it with the profit margin that the market would stand.

Pricing policy is thus being used as a tool of management to ensure a healthy and critical relationship between Supplies Division and its customers in the context of a tied customer relationship and for making the Division face up to some of the disciplines it would have to face in a commercial situation.

Performance indicators. It is a pity that the decision had to be taken not to charge market prices and thus make profit a simple measure of performance as in private business. We would have made a killing in Supplies Division! In the absence of profit-making we must produce other criteria for demonstrating efficiency. We are feeling our way slowly forward and our thoughts at present lean towards using criteria on something like the following lines:

(*a*) *Absolute external comparisons.* Absolute comparisons entail making a full review—'Market Price Review'—of the outputs, cost and prices of the Division and one or more of the more efficient outside suppliers.

(*b*) *Relative external comparisons.* Since the 'Market Price Reviews' are a costly and time-consuming exercise, however, it is desirable that they be supplemented with a regular monitoring device which would do away with the need for frequent absolute comparisons yet at the same time give 'early warning' of the need to undertake an absolute comparison. This role can be fulfilled by comparisons not between absolute price levels, but between relative price movements. Such comparisons are easier to make and, moreover, they do not require an exact correspondence between the Supplies Division product and the outside analogue.

(*c*) *Internal comparisons.* There will, of course, be commodities and services which are not susceptible to either of the above systems. Here it will be necessary to rely on internal comparisons. Such comparisons can be made for any commodities or services provided on a regular basis; and the technique can, therefore, be viewed as

a basic minimum, which will allow us to determine whether the provision of a certain service cost more or less than last year, and whether the price was higher or lower to the customer.

(*d*) Finally, there is the question of standards of service. Here monitoring devices can be relatively simple, taking the form for instance of checks on delivery times, and the setting of minimum percentage targets for the meeting of orders for stored items from stock.

(*e*) We are also in the course of developing other supplementary criteria of performance. We shall for instance monitor the total cost of office furnishing for government by keeping an index of costs *per capita* or per 100 square feet spreading total costs over the number of civil servants or the total area furnished and seeing how this changes year by year.

This in very simple terms is the basis of the system of performance measurement which we are currently developing.

Accountability. This leads me to the last point I want to deal with—accountability. The setting up of a unit of accountable management alters substantially the nature of accountability. Supplies Division will be providing goods and services to its customers at prices which cover all its costs. Provided therefore it does not require a capital loan increase and that receipts from sales cover costs (including return on capital), it will not be in receipt of annual moneys from Parliament. The question of annual appropriation as an aspect of accountability does not therefore arise. Neither, of course, will the unit require Treasury approval or presumably financial delegation for its day-to-day decisions.

Nevertheless the appropriate departmental Minister will be responsible for the efficient management and operation of the trading fund through which an accountable unit of management will be financed. The head of the accountable unit, whether he is his own Accounting Officer or not, will have to satisfy someone placed outside the accountable unit:

(*a*) That the aims and guidelines of the unit have been properly defined.

(*b*) That the periodic accounts comply with any financial directives laid down by Parliament.

(*c*) That adequate measures of performance have been laid down and are being met.

(*d*) That proposals for additional borrowings of capital are justified or that surplus moneys should be paid into the Consolidated Fund.

Subject to broad control on these kind of lines, the head of the accountable unit should be responsible for the management and overall performance of his organization.

The changes in accountability will have to be accompanied by greater freedom in other fields—in establishment matters and in contracts, for example. In all this the main need will be a change of attitude —a recognition that the head of an accountable unit, through the

out-turn of his trading accounts and measurement against performance indicators, will be operating in a goldfish bowl, suffering almost certainly from over-exposure. The *apparatchiks* of Whitehall will have to adjust themselves to the idea that traditional constraints have been replaced by much more compelling ones—that people in charge of an accountable unit of management will have to balance their books, demonstrate they are efficient and competitive and show a return on capital.

Conclusion

I have mentioned at great length those tools of management which I think are relevant to the establishment and management of accountable units of management. I am expressing a widely held view when I say that there is over-emphasis nowadays on forms of organization, on management theories, on techniques and mechanisms instead of on the human qualities of managers and the human aspects of management.

Management techniques, tools of management, like management training, ought to make a good manager a better manager or make a bad manager a less bad manager, but it is highly questionable whether they ever make a bad manager into a good manager. Life is a story about the development of human personality. The best tools of management are those which provide human beings with scope for that process of development and which, by offering them opportunity for self-expression and personal fulfilment in their work, harnesses their energies to purposes which serve the larger interests of the individual, of the organization and of society.

Diagrams 1–4 referred to at page 123 follow at pages 131 and 132.

The third and last article in this series—*Personnel Management—Freedom and Control* by Mr. Kenneth Cooper, Chief Executive of the Employment Service Agency—will be published in the November edition.—*Editor.*

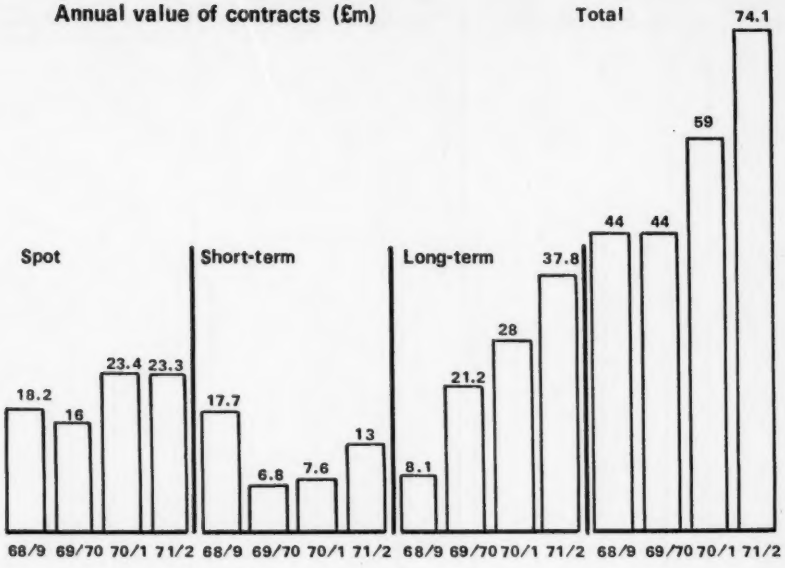


Diagram 1

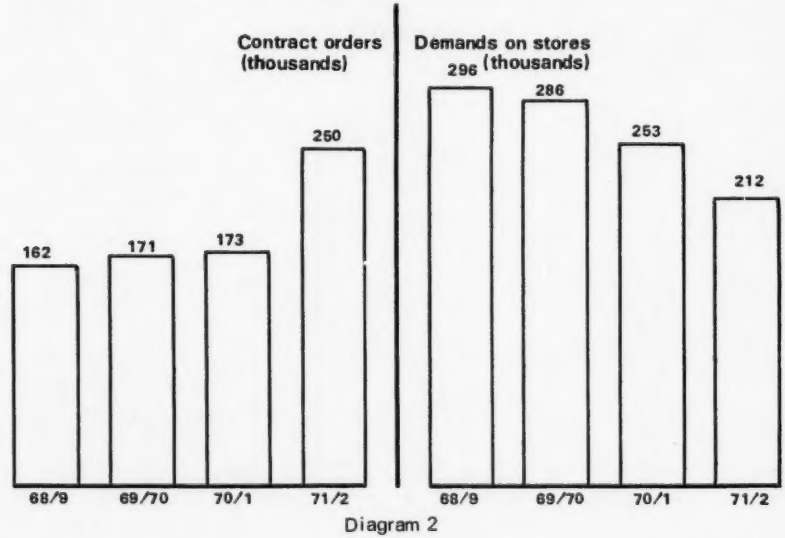


Diagram 2

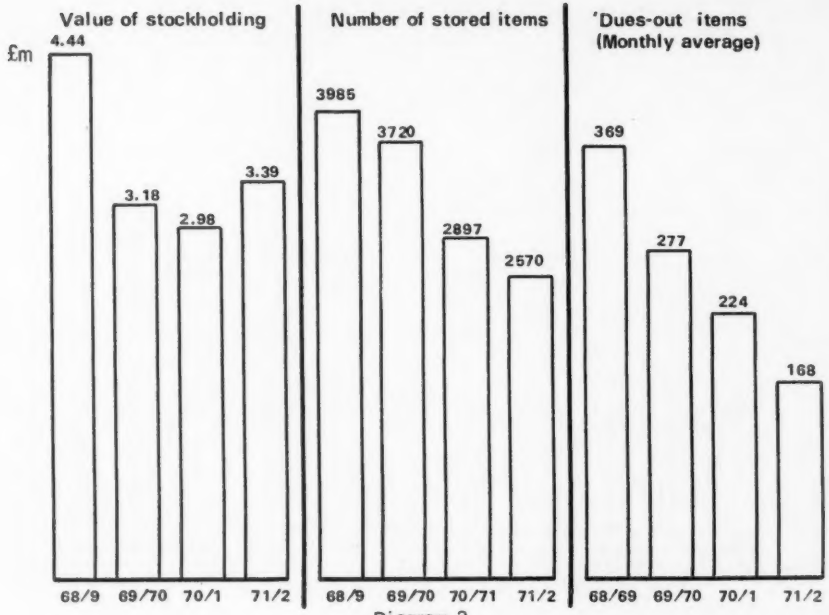


Diagram 3

Purchasing staff in post

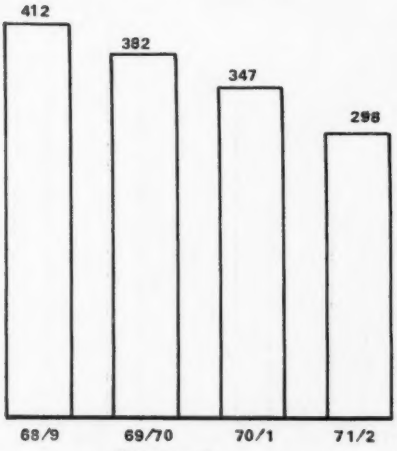


Diagram 4

Job Satisfaction in the Civil Service—a Perspective

K. B. ROBERTSON, Civil Service Department

Keith Robertson is a consultant attached to one of the Personnel Management Divisions of the Civil Service Department. He is currently leading a mixed team of consultants and civil servants conducting a series of studies in job satisfaction in various departments of the Civil Service. In the article that follows he expresses some personal views.—*Editor.*

The spectrum of work experience

People and situations interact. A person's 'experience' is that interaction as seen by himself; a person's 'behaviour' is that same interaction as seen by others. In a work setting, the two basic constituents of either experience or behaviour, therefore, are the person and the job.

People are multidimensional. Economic and social circumstances, psychological make-up and intelligence, family background and educational experience—many factors come together to produce, in each person, a unique blend of talent and personality. Each person has his or her own particular 'profile' of characteristics, needs and aspirations.

Jobs too are multidimensional. The size, nature and aims of an organization, its technology and administrative procedures, the whole environment of location, pay, facilities and fellow workers—all come together to produce, for each job, a unique profile of task, conditions and reward.

Clearly there is an enormous range of possible interactions between people and jobs. Within any one society, however, and even more so within a particular organization such as the Civil Service, the interactions which take place in practice vary over a finite and quite familiar spectrum. From the official side, this is the spectrum of employee behaviour; from the individual or staff side, it is the spectrum of work experience.

At one extreme of the spectrum (X) are people who work only to live. Five days of numbing drudgery buy two days of rest; that is all. People are anonymous at this end of the spectrum, their jobs low-level, unskilled and prescribed. Such people may respond to the carrot or the stick, but they would not do the job at all if they could avoid it. Under these conditions job satisfaction is a patent contradiction in terms.

At the other extreme of the spectrum (Y) are people who live only to work: among this group might be numbered certain artists, scholars, social workers, missionaries, athletes and entrepreneurs. These are people for whom one activity is of such over-riding importance that

everything else is subordinated to it. If they take a holiday, it is in order to return to their work refreshed. Such people are self-motivated; their work is freely chosen, voluntarily embraced and developed; the satisfaction it brings them is paramount.

Most people's work experience falls somewhere between these two extremes. This is not to say that individuals are spread evenly across the whole spectrum, however: in practice, a degree of polarization seems almost inevitable. With the kind of institutions we have today, many people's experience of work tends toward the X end of the spectrum; the experience of rather fewer people tends toward Y.

Tending toward X are all those who are more conscious of being in a job than they are of having a career. All too many clerical and shop-floor jobs, and many supervisory jobs as well, in practice come into this category. People in these jobs work under instructions, they have little or no say in deciding what should be done or how it should be done, their main enjoyment and satisfaction is obtained off the job. The routine of the work may be mitigated to the extent that it is possible to gain some sense of achievement in coping with it; it may be feasible to develop some limited kind of 'ownership' of the job, especially if it involves the exercise of some skill. Essentially, however, the work is imposed; its nature, its conditions—even its duration—are determined by others. Fringe benefits may be good, colleagues may be cheerful, but the main compensation for the toil remains the money it brings in.

Tending toward Y are those whose circumstances and make-up are such that they inherit, or are able to choose, a career which brings them interest, enjoyment and material reward in the kind of proportions they seek. Among this group might be numbered many professional and business people—teachers and doctors, scientists, lawyers, managers and administrators. At least some intrinsic satisfaction from their work is taken for granted by these people. They are likely to be subject to all the constraints of a career structure—the 'rat race'—which for many will lead to frustration. But most, especially the more successful, are able to identify with their work and gain self-respect from it. As they graduate to positions of responsibility and opportunity, they are able to see themselves as making a personal contribution, solving difficult problems, providing a useful service and achieving something worthwhile, as well as making a certain amount of money and wielding a certain amount of power.

It must be remembered that the spectrum is one of interaction. In the case of some individuals in senior and apparently responsible positions, the interaction is at the X end of the spectrum; in the case of some individuals in junior and apparently mundane jobs, the interaction is at the Y end of the spectrum.

Expressed in terms of employee behaviour, the Y end of the spectrum is high in self-determination and achievement, ownership and control of the job, use of abilities and development of skills; conversely, the X end of the spectrum is characterized more by compliance, be it willing

or reluctant. Expressed in terms of work experience, Y is high in a sense of identity, purposefulness, responsibility and worthwhileness; conversely, X is characterized more by a sense of alienation.

Forces of disequilibrium

A stable society is one in which there is a 'fit' between people and jobs across the whole spectrum of work experience. When available job opportunities are appropriate to people's economic, social and educational circumstances, the balance of supply and demand tends to be mirrored by a kind of psychological equilibrium in which personal needs and aspirations are defined in the light of available opportunity. Expectations match reality, and so reality matches expectations. Organizations can guard against individual cases of imbalance by careful recruitment, selection and promotion. There is no threat, under these conditions, to existing patterns of technology, organization or management.

We do not live in such a society. People's economic, social and educational circumstances are changing, and changing rapidly. New norms of experience, attainments and aspirations are being created. In the interaction between people and jobs, people are becoming a much more volatile element.

During the last 20 years, the increase in average earnings has been almost twice as great as the increase in the cost of living. It is true that Britain has been outstripped by almost every other advanced economy in terms of living standards; it is true also that low paid workers, old age pensioners and the homeless still present major problems—but the incompleteness of the process so far would suggest, if anything, only an acceleration in the future. People with television and motor cars, who go on continental holidays and own the houses they live in, have a different experience from earlier generations—and different standards. They are likely to be more ambitious and better informed, less tolerant of the system and more independent in their thinking. Compliance does not come so readily to those who are not on the bread-line, and indeed have no bread-line against which to compare themselves.

Whether the job opportunities are there or not, more and more people are being better and better educated. Young people with degrees may be no more intelligent than their parents who had no chance to go to university, but they, and their parents for them, certainly have different aspirations. The same pattern holds at school-leaver level, with the children of many families obtaining GCE-type qualifications for the first time ever, raising hopes for a better future. Again, the incompleteness of the process to date merely indicates the extent of the change yet to come.

It is not only the amount of education that is changing, it is also its style. More and more schools place emphasis on participative methods of learning; teachers tend to be less authoritarian; rules and punish-

ments are less restrictive. Wider subject choice, more imaginative extra-curricular work, better facilities for sport and cultural activities: all tend to change the quality of the educational experience which precedes work experience. If the latter remains static, tension must result.

Alongside and related to such developments is another: more intangible, yet with the proven potential to make a sharp impact with surprising suddenness. This is the growing concern, expressed in many different ways, with the quality of life. It may be that only an affluent society can afford to react against the excesses of materialism: what matters is that the reaction is taking place. Within a frighteningly short space of time, forms of organization and work processes that we now take completely for granted could become as unacceptable as the uncontrolled discharge of effluent from a chemical plant.

Thus, even if jobs were constant, the people who interact with them are changing. Across the whole spectrum, the aspirations of both individuals and society are tending more toward Y. That alone would create instability, but the situation is more serious yet. For across the whole spectrum also, the reality of jobs is tending more toward X.

Organizations are becoming larger, their policy-making processes more remote from the individual unit. Take-overs and mergers in industry and commerce; supermarkets and chain stores in the high street; larger civil service departments; the regionalization of local government—all have the effect of dispossessing the individual, reducing his stake in relation to the whole, either as employee or as customer.

The technology and control systems of large-scale operation have a profound effect on people's experience of work. It is not only in manufacturing industry that mass production takes the skill out of jobs; the equivalent of the assembly line is to be found in any large-scale clerical operation. The whole trend of 'scientific management' has been toward the fragmentation of jobs into small separate specialist functions, incomplete in themselves—and this not only at shopfloor level. If individual initiative is incompatible with a computer system, it tends to be the individual initiative that is jettisoned. Increasingly, authority itself, far from being earned as the young demand, may in practice be arbitrarily determined by technology.

The increasing imbalance between people's aspirations on the one hand and the reality of job opportunities on the other cannot be tackled by reducing aspirations. Sophisticated technology may impoverish people's jobs, but it does not impoverish people; on the contrary, it makes their economic, social or educational subjugation a political impossibility. No government could have as its policy a reduction—or even, more than temporarily, a stabilization—in living standards or in education. However inconvenient to industrialists or bureaucrats, public concern for the quality of life is here to stay. We are no longer in the days of the Luddites: in any conflict now between people and jobs, people are going to win. Only those institutions which accept this and come to terms with it will survive as dynamic entities.

The situation within the Civil Service

Within the Civil Service, any attempt to bring jobs into line with aspirations immediately encounters some very particular difficulties. The constraints are notorious, their mythology pervasive—the increase in complexity both of legislation and of Civil Service functions; the Janus-like ambivalence of an organization serving Ministers and public; the inevitable concern for numbers; the ever-present reality of public accountability; the need for accuracy, probity and equity in the treatment of individual citizens.

In such an environment, it is natural that responsibility should be diffuse, that conformity should seem more important than initiative or risk taking. How can cost benefit or effectiveness be our concern when we hardly know how to measure such things, and when the outside world is apparently only interested in straight cost? Under the relentless pressure of operational activity, what time or effort can be spared for innovation? How can accuracy be ensured without checking, or equity of treatment secured without codes of instructions? What place can there be for individual discretion?

The dilemmas are real; they are far from solved as yet. But solved they must be if job satisfaction is ever to be more than a slogan. And civil servants would be less than human if they did not occasionally take refuge behind the difficulties in order to side-step the need for radical action.

As in so many other fields, one useful starting point is a critical appraisal of present procedures. It is worth checking, if only we can discover how to do it, that our control systems really control, that our checking procedures really prevent fraud or error, that our codes of instructions really secure equity of treatment. If they don't—or if the same result or better could be obtained some other way—they are mere shibboleths, not constraints.

Meanwhile, and this is easier said than done, we can at least not add to the problem. We can reject any new method or instruction or device which reduces the individual employee's scope or freedom of action. If every person in the Civil Service who ever sent out an instruction for others to follow were to stop and ask how else the aim might be achieved, the effect might be startling.

We might even postulate, contrary to all received doctrine, that it is possible to delegate responsibility as well as tasks. Perhaps the job of an individual officer or working group can be defined not only in terms of following instructions, but also in terms of being fair or accurate or consistent. Some of the energy we devote at present to imposing control might well be devoted instead to developing means of measurement and feedback to allow individuals and groups to exercise their own control.

Once we have put our own house in order, we can challenge whether present forms of public accountability are suitable any longer, whether the contributory principle of national insurance really justifies the con-

tinued employment of many hundreds of young people on routine tasks of record keeping, and much else.

For the moment, however, we are at the very early stages of the process. For the last two years, a small 'job satisfaction team' of civil servants and consultants has been attached to the personnel management side of the Civil Service Department. The team has no monopoly of work in this field, of course: staff in other Departments and other parts of CSD are actively engaged with the same issues. The team's particular contribution has been to mount a series of studies in different Departments, in association with the Departments themselves, to investigate the scope for, and the likely consequences of, introducing changes specifically designed to improve job satisfaction.

Some lessons are beginning to emerge from the work with a fair degree of clarity now. First and foremost, job satisfaction does not lend itself to any easy manipulation; it is not a gimmick which can be plugged in with minimal disturbance to the existing framework. The issues raised do not allow of instant solution; there are no panaceas. We may arrange for people to sign their own letters, for example, but does this really shift the experience of that job one whit further toward the Y end of the spectrum? What about the rest of the job, and its other constraints?

Job satisfaction does not exist, and cannot be improved, in isolation. It is intimately bound up with the individual himself, his fears and prejudices, his competence and drive; it is intimately related also to organization, technology and management style, for the reality of an individual's work experience is largely defined by these three boundaries. A job may be broken down into particular operations for administrative convenience, for the convenience of a computer, or for supervisory convenience: it is important to know which, and to follow out the inter-relationships between them. A 'systems' approach is called for, but one which defines people as people and not as units of manpower.

Measurement is vital. It is only when proper measurement exists that the control of tasks—as opposed to the tasks themselves—can be delegated with confidence. There is nothing to prevent a local manager from running his own unit, responsibly and accountably, so long as he and his headquarters speak the same language. They do not always do so at present, for measurement of the type required all too seldom exists: it has to be patiently evolved through dialogue and experimentation; it cannot be successfully imposed.

It is the processes of change, rather than the changes themselves, which matter and which are going to have a lasting effect. Experience must be generated, forms of participation hammered out. In the present series of studies, for example, many hundreds of ideas for change have been developed in 'brainstorming' sessions with many different groups, including one such session initiated and conducted by the staff association concerned. It is not possible to delineate at the beginning exactly

where such processes will lead, but this very open-endedness helps to guarantee a different quality of experience. Already the studies have proved that it is possible to experiment, without courting disaster and without disrupting operational activity. The next step is to ensure that experimentation becomes on-going, that it is no longer seen as something separate from or additional to the normal management or work group task, but integral to it. The processes of change must become internalized.

There is an enormous amount to be done, and done urgently, if the Civil Service is to tackle its most pressing problem of the under-utilization of talent at all but the most senior levels; if jobs are to be brought more into line with aspirations, so that good young staff can be recruited, retained, encouraged and inspired to rebuild in a new environment and on a larger scale the very best traditions of public service. The task may seem daunting, but the last two years have seen a very considerable change in attitudes. There is a much greater awareness of these kinds of issues now, both on the official side and on the staff side, both in CSD and in Departments. Despite all the constraints of public accountability and the like, the Civil Service in 1973 may well be poised for one of the most exciting periods in its development.

A Review of Forms

M. H. HERLIHY, Procurement Executive, Ministry of Defence

Readers of the May 1973 edition of this journal will be aware of the 'returns' stage of the Chief Executive's attack on the paperwork of the Procurement Executive, MOD.* This was directed at the supply of information collected at regular intervals (the Review of Returns) and it resulted in a significant reduction in the number of returns made to various levels of management. The second and more ambitious stage was to review all the forms sponsored by PE to see whether their number could also be reduced.

The need for forms is primarily determined by, and is a reflection of, procedures. It can be argued that greater savings in the use of paper can be achieved by examining particular work procedures than by a general review of forms. Eliminate a procedure and the need for the forms disappears. There was, however, the question of deciding which procedures should be examined, and which were likely by simplification or revision to achieve the biggest reductions in paperwork. Another question was whether it was possible to decide merely by looking at a form whether it was necessary. This was likely to require an understanding of the underlying procedures and the needs of local management. We, in Management Services Division, realized we should require considerable help if the review were to proceed to the stage reached by the Review of Returns, namely the detailed examination of every form and deciding whether it was really required. This would be a daunting and time-consuming task. Nevertheless, a review of forms could be looked upon as an investment for the future; the initial staff effort might be more than compensated for if the review produced substantial reductions in the number of forms.

Whichever way the exercise was to be tackled, its magnitude was obviously going to be far greater than the Review of Returns. To assess how much greater, we had to obtain a clearer picture of what was involved. As a first step, all divisional heads and directors of establishments were asked to forward estimates of the numbers of forms sponsored by their areas. The exercise was to be all-embracing and these estimates were to cover all types of forms—temporary, permanent, numbered and unnumbered—however they were produced. By 'sponsor' we meant the authority responsible for the introduction of a form, for its subsequent amendment and for arranging further supplies. None of this information was available centrally. Although PE arranges for some of its large-user forms to be printed by the Office Services

* *Reducing the Flow of Regular Information Returns* by D. C. Henderson, Volume 28, Number 2, p. 85.

Division or by HMSO, many of the work areas, particularly the R. & D. establishments and Quality Assurance Divisions, have their own printing facilities, and design and print their own local forms.

The estimates indicated that there were in the region of 25,000 forms sponsored by PE. A decision was taken to exclude the forms used by the Royal Ordnance Factories on internal administration, and this left us with a figure in excess of 18,000. We were then able to assess the staff effort required for the collection of forms and their examination, for the subsequent work of deciding whether the forms were necessary and seeking the agreement of local management to their cancellation. Our assessment showed the staff effort would be considerable and unlikely to be acceptable unless it could be clearly demonstrated that the review was likely to produce significant reductions in paperwork and consequential staff savings. This we were unable to do, and so it was decided that we should collect and analyse the forms and use the findings as a guide to the possibilities of rationalizing and simplifying procedures which could lead to a reduction in the use of forms. If the findings indicated that this would result in significant savings, then we would consider going ahead with the detailed work necessary to make the reductions.

And so, in July of last year, divisional heads and directors were asked for copies of all the forms sponsored by their areas. At the same time we asked for some supplementary information, including the title and purpose of each form and an estimate of the annual usage.

Upon receipt the forms were registered and given unique reference numbers. This was a system of a code letter prefix (e.g. 'A' for Controller, Aircraft) and a series of numbers beginning with '1' for each code letter. This simple step proved invaluable for the subsequent control of the exercise. We knew it was always possible to get back to square one and this was reassuring. Moreover, it was likely that at some time in the future the sponsors would need to know how their forms had been classified and it was also possible that they would have to be returned for control purposes.

After registration came classification. The previous article dealing with the Review of Returns discussed the Knox system of classification and how the system was adapted for that exercise. Using the experience gained then we constructed a thesaurus which we thought would be suitable for the review of forms. Because of the much larger number of forms we decided to include the function as well as the subject and operation classification. By function we mean 'the purpose which the form is supposed to accomplish'—for example, to report, to approve or to acknowledge. The subject is 'the matter or thing in relation to which an action takes place'—for example, accommodation, employee or store; the operation is 'the action that takes place'—for example, appointment of, inspection of or delivery of. Classification is required to bring together forms which serve the same or similar purposes.

We did not find this system of classification entirely satisfactory.

Despite the supplementary information provided by sponsors, examining a form does not always reveal just what the form covers and what it is supposed to do. We found that individual classifiers, because of their different backgrounds and experience, did not interpret classification headings in the same way. We soon found that 'establishment' means different things to different people! There are also the multipurpose forms which request, recommend, approve and report. The greatest problem, however, was that classification by subject, operation and function brought together forms which served the same, but very narrow, purpose. This would be ideal if one were considering the introduction of common forms instead of local variants, but our objective was to identify procedures which might be simplified or eliminated. We found the underlying procedures tended to be obscured by this initial classification. For example, forms which asked for completion of other documents were originally classified 'to request completion of documents' under the subject/operation/function system. It became obvious, however, that these were part of procedures dealing with, say, 'inspection notes' or 'annual confidential reports', and should have been included with forms of other classifications, such as 'stores—inspection of' or 'employee—suitability of'. During the exercise the thesaurus and classification system evolved to meet our particular requirements. Our experience shows that the method of classifying forms must be attuned to the objectives of the exercise. This emphasizes the importance of establishing precisely what the exercise is required to achieve, whether it be standardization of forms, the identification of procedures or the supply of information to various levels of management. Changes during a review can lead to the expenditure of a lot of effort when one is dealing with a large volume of paper.

We received nearly 16,000 forms and found that several million copies of these were used in a year by PE. This excludes the use of those forms for which PE is not the sponsor. For example, the Accounts and Office Services Divisions provide common services across the whole of MOD, and they are not regarded as being within PE. Nevertheless, their forms are used by PE together with forms sponsored by other parts of MOD.

After classification the forms were presented to experienced staff in PE Management Services Division for analysis. This showed there was considerable scope for reducing the variety of forms by the adoption of common forms. With the large number of semi-autonomous establishments and divisions with their own printing facilities, this was not unexpected. Whether it is economically worth while to introduce common forms in place of local variants depends very much on the availability of printing facilities within a Department or work area. Where most of the printing is undertaken centrally the adoption of common forms is more likely to be economical. In PE, however, which is organized into large discrete blocks with decentralized printing facilities, standardization is less likely to be economically worth while.

Of course, there can be other benefits from, say, a policy or administrative point of view, and the absence of standardization can indicate different work procedures of varying complexity.

More significantly, so far as our exercise was concerned, the analysis identified many procedures where simplification or elimination leading to a reduction of paperwork seemed to be a practicable proposition. At this stage we could not estimate what the savings would be, but it appeared they could be substantial: detailed study, together with the involvement of local management, would be required before we could be more specific. We felt confident enough about the possible reductions that could be obtained to draw up a programme of work and to seek the approval of the Management Board to our proposals.

We also sought the Board's endorsement of our proposals for the future control of forms. The system for controlling forms, for example whether it should be centralized or decentralized, will depend to a considerable extent on the work and the organization of the Department or work area. How diverse and technical are the procedures represented by the forms, where are the printing facilities; to what extent has responsibility been delegated to line management? In our view a centralized control system was inappropriate for PE. The control of forms would be better delegated to line management, but to provide central management information and indicate the growing or declining use of paper, the forms control sections should supply annually to Management Services the numbers of new forms they have approved, or old forms which have been cancelled.

The Management Board approved our proposals, and arrangements are now being made for detailed studies of procedures and for handing over to the control sections the material and information they require for the subsequent control of forms. It is, of course, too early to say how successful the review has been or will be. The exercise has required a lot of staff effort—at its peak the forms review team consisted of more than 20 staff, mostly clerical—and to this must be added an element to cover the effort of local staff engaged on the collection of forms and the provision of information, and the analysts' time. During the collection almost 2,000 forms were found to be obsolete or unnecessary. We expect the studies of procedures will result in further substantial reductions in paperwork, but this will have to await the outcome of the detailed work of examination and review. What has already been achieved is a much greater awareness by management—central and local—of the cost (in terms of effort and finance) of paperwork in PE and of the need to keep this to an absolute minimum. Moreover, the forms that have been collected and the system of classification provide a comprehensive picture of the activities of the Procurement Executive.

Revitalizing a Pneumatic Tube System

T. H. GRAY, Government Communications Headquarters

Introduction

The system described was installed in the new GCHQ building in 1952. With some changes to the number and position of terminals it has been in continuous (5-day) operation ever since. Initially two carriers, i.e. document conveyors, were supplied to each terminal. In succeeding years the standard way of dealing with complaints about the service offered was to inject more carriers into the system. Latterly, however, there had been a growing wave of dissatisfaction with the system. Much of the criticism was highly subjective and in an effort to trace the root cause O & M Branch was called in to investigate and report.

Brief description of the system

There is provision for 54 terminals (stations) (*see illustration* 1 *opposite*) able to send and receive carriers to and from each other via the manually operated tube exchange (*illustration* 2). Normally two operators are on duty and, at peak periods especially, both are kept busy. Terminals are located in registries, despatch areas and branch headquarters, and are identified by a number within the block 1–54. At the time of our investigation 10 terminals were not in use and consequently were blanked-off in the exchange (*see left-hand side of the console illustrated at* 2). Carriers are fitted with movable rings on which the consignee's terminal number can be dialled. At the exchange incoming carriers fall on to moving belts which convey them to the operators in front of the console (*see illustration* 3).

Rules for operation of the system

The rules originally laid down were simple. Each terminal was allocated a pair of carriers with the terminal number engraved on the barrel. Material for despatch was to be placed in a carrier, the consignee's terminal number dialled and the sealed carrier sent to the tube exchange. Here it would be routed on to its destination. On arrival the material was to be removed, the dials set to øø and the carrier sent back to the exchange. The fact of the rings being set to øø and the carrier being empty (they are transparent) alerted the operator to send it back to the terminal engraved on the carrier.

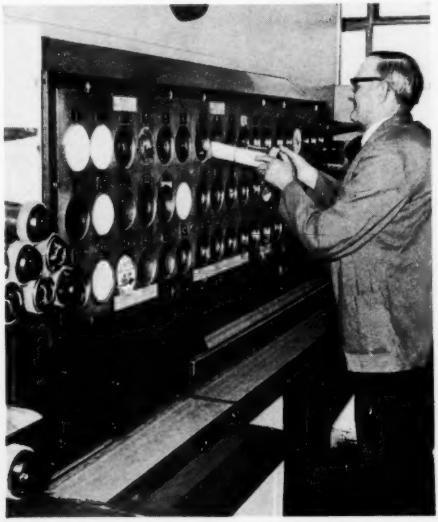
Fact-finding

After carrying out several unsatisfactory interviews with users of the

Some views of the pneumatic tube system at GCHQ—*see article on opposite page*

Illustration 1

Illustration 2



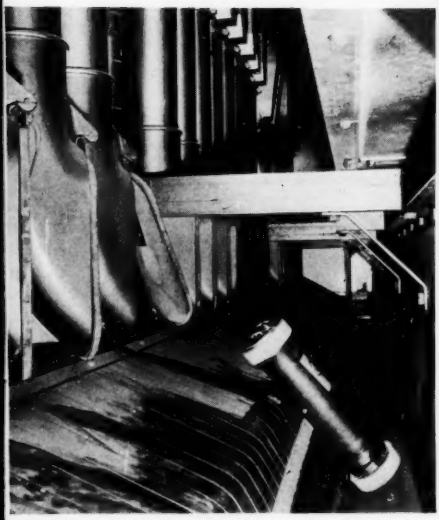
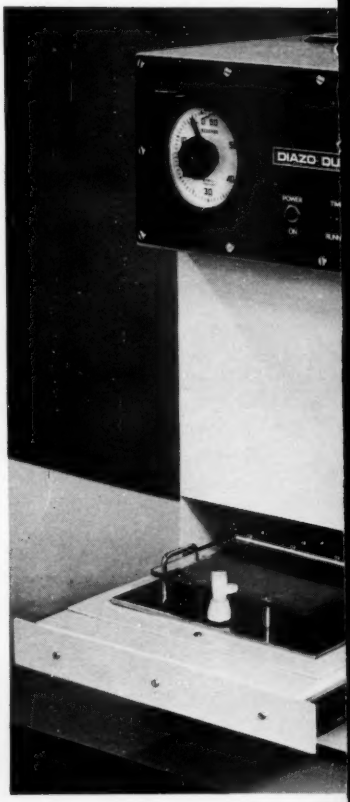


Illustration 3

Speedflex Visible
Index Cabinet

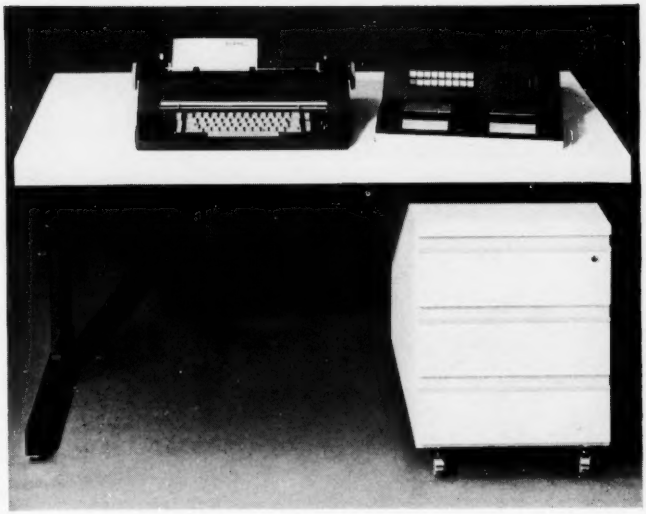


DEK Microfiche Duplicat

3M Model 600
Reader/Printer

3M Model 169
Micro-Jacket Filler

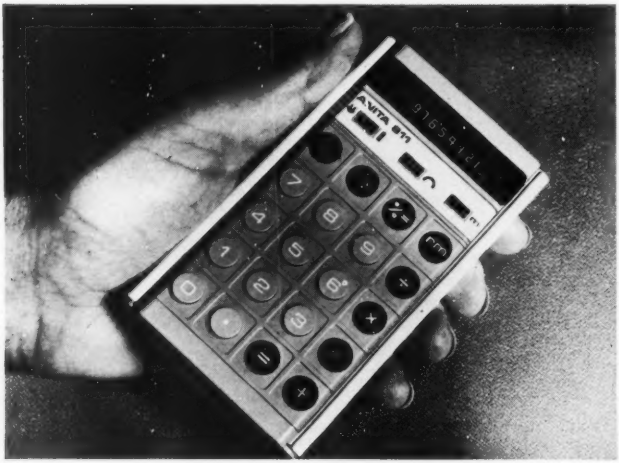
or (Exposure Unit)



Diehl Autotext
Automatic
Typewriting System

Pitney-Bowes
Model 1192
Letter Opener

Stromberg Model 250
Date and Time
Stamp Recorder



Anita 811
Pocket
Calculator

system we concluded that little was to be gained from pursuing this line of enquiry. Users were more than willing to talk about their problems, but not unnaturally their views were highly subjective and speculative. We decided that the only way to find out what really did happen was to mount a full-scale monitoring exercise in the tube exchange.

As a preliminary step we spent half a day in the exchange intercepting carriers and adding to each a uniquely numbered Takypeel label. The following day pairs of Assignment Officers working in relays (2-hour shifts) logged the movement of every carrier through the exchange. A typical log would read as follows:

Time	*Carrier No.*	*Terminal No.*	*Destination*	*Comment*
0903	136	42	7	
	57	17	23	
	82	8	øø	E
	27	53	12	E
0906	49	....		

and so on. Times were added whenever possible, but three-minute increments were the minimum requirement. The letter E in the *Comment* column denoted that the carrier was empty. We soon found that frequently the rings were not turned to øø when the carrier was returned empty (*see the fourth log entry*).

The days that followed were spent analysing the mass of data derived from the monitoring exercise. The time occupied was well spent because the findings were particularly revealing. They showed that many users failed to observe the basic rule of returning empty carriers to the terminal of origin. Instead carriers were appropriated for their own use. Because carriers were not opened in the exchange this had passed unnoticed. There were other users who strictly complied with the rule often seemingly to their own disadvantage and those who had alternating periods of compliance and non-compliance. The net effect of this was a reduction in the number of effective carrier movements. We estimated that the reduction was almost 30 per cent. The reason that the system did not break down completely was that eventually an appropriated carrier reached a terminal where the rule was obeyed. We traced as many as eight consecutive movements by a carrier before it returned 'home'. There was a tendency for the number of users disobeying the rules (pirates) to increase, probably caused by the frustration of being without their own carriers. We felt that without any check all users would eventually become 'pirates'.

Proposals for change

Having thus pin-pointed the trouble there were two courses open to us. We could highlight the fact that the rules were being broken, nominate the offending terminals and recommend that the officer-in-charge tighten up on tube discipline. This would at least restore the original

status quo and, perhaps, confidence in the system. But there would be a tendency to slip back into the old ways once the initial impact had subsided. The alternative was to examine more deeply the reasons for breaking the rules and seek to profit by what we found.

We began by studying the effect of piracy on the system. As already stated the pirates had (inadvertently) reduced the number of carrier movements by one-third. Suppose (and this is the irony of the situation) the pirates were, in fact, making better use of the facilities than the pirated. True their unilateral action was working to their advantage and to the detriment of others, but if we legalized their method everyone might gain. The more we thought about it the more convinced we became that this was a theory worth pursuing. We next examined the relative traffic totals at each terminal. Based on the movements of full carriers this revealed that of 44 active terminals 23 were mainly exporters, 16 mainly importers and 5 had roughly equal imports and exports. This situation seemed to indicate that the system was balanced enough to stand a trial of a 'free-for-all' method of operation. Under this method carriers would cease to be allocated to specific terminals and thus empties could no longer be returned to originators. We proposed that a maximum of three carriers could be held at any time, any surplus being sent to the tube exchange to be withdrawn into the common-user 'pool'. Terminals requiring carriers were to obtain them by telephoning the exchange. Generally importers would be returning carriers whilst exporters would be requesting them. A short note of explanation was drafted for the Head of Office Services and widely circulated to those likely to be concerned. Much of the success of the trial would depend upon a speedy reaction to calls for spare carriers. In order to instil confidence in users we cheated slightly by having two additional telephone receivers fitted working on a search basis. Only one extension—2109—was publicized but 2110 was available in case 2109 was engaged and then 2111 in the (unlikely) event of both 2109 and 2110 being engaged. We felt that this 'cheating' was justified because, particularly during the early stages, staff would be adjusting to the new situation and would tend to make more calls than usual. We also felt that apart from requests for carriers there would be calls from staff anxious to discuss and comment on the new method. Finally we wanted to have our own private line (2111) available between tube exchange and the O & M Office. The trial was arranged for three days —Monday to Wednesday—and was under continuous O & M surveillance although the normal exchange operators were on duty. The first stage was to mask out the terminal number on all carriers by using serially numbered Takytite labels, the serial number providing a means of identifying carriers for logging purposes. Logs were kept of all carrier movements through the exchange and also of all incoming telephone calls. Where appropriate the number of carriers requested was noted. A quarter-hour check was also maintained of the number of carriers in 'pool', i.e. available for issue from the exchange.

The final hour of the trial was reserved for restoring the system to normal. This mainly involved removing the masking labels and sending a short end-of-trial message to all terminals. (During this period we had two telephone calls requesting us to leave the new method in operation, but our brief did not permit us to take such a decision.)

Conclusions

Analysis of the results proved conclusively that the free-for-all method provided a more efficient service than the old method. The following points were significant:

(*a*) The number of carriers in 'pool' never fell below 38 and at times exceeded 100 with a mean around 50.
(*b*) (Consequent upon (*a*)). All requests for carriers were met normally within 20–30 seconds.
(*c*) Comments were without exception favourable.
(*d*) There was an increased volume of traffic probably reflecting a degree of renewed confidence in the system.

We therefore submitted a report recommending permanent adoption of the new method. This was accepted and implemented on 1st January 1972.

Postscript

Inevitably there were teething troubles. Oddly enough the main concern was a periodic shortage of pool carriers. Fortunately we were able to pin-point the cause as hoarding of carriers at importing terminals. An explanatory note to the users concerned had the desired effect and at the time of writing the system was running smoothly. We do not claim the free-for-all or 'common-user' method is perfect, but at least it prevents users making unilateral changes to it and thus provides a permanent degree of stability.

Bill Paying and Vote Accounting on an EDP System

N. F. HOME, Home Office

Introduction

Towards the end of 1972 a revised system of bill paying and vote accounting was introduced in Home Office Accounts Branch. This article describes the previous system and the main considerations which led to the decision to purchase new equipment, and goes on to give some account of its installation and range of functions.

Previous system

The branch at Tolworth, Surrey, produced about 3,000 payable orders each week of which about 95 per cent were prepared manually in the typing pool. At the same time as the typists prepared the payable orders they prepared a schedule of payments which was sent to the Paymaster General's Office (PGO) for reconciliation with the payable orders after they had been presented for payment, and a payable order register sheet. The other 5 per cent of orders for regular payees, together with the schedule and register sheet, were prepared by HM Stationery Office at Basildon on addressing machines. All the orders were numbered and the numbers entered on the schedules in Accounts Branch, who also had to check the material prepared by the typists.

Payments were classified in Accounts Branch by heads of charge and then posted to ledger cards to achieve, among other things, the vote accounting. Expenditure from six votes has to be accounted for. There were about 4,000 ledger cards which were posted manually on accounting machines. The machine process consisted of entering the date and identifying number from the posting media, picking up the current balance and posting the debit/credit amount to produce the new balance. The other things additional to vote accounting included separate records of expenditure at individual outstations, or groups of outstations, and other detail required for management purposes; and a wide variety of suspense accounts.

Assessment

By 1971 the need for early improvement in the system of bill paying and vote accounting was becoming increasingly apparent. An important factor was the need to centralize in Accounts Branch the payments made at outstations. This would double the workload. It was recognized that there would be distinct advantages in the greater centraliza-

tion of bill paying. The integration of such routine in a single system would make for maximum economy in staffing and equipment needs as well as facilitate the assembly of, and access to, accounting information needed for financial planning and other management control purposes. Any revised system of bill paying would therefore need to cope with an increase of about 100 per cent in the workload during its first year of operation and have the potential to cope with further work as demands for management accounting information grew.

At the same time Accounts Branch had been noting significant advances in the field of small electronic data processing systems, and thought it might be worth while to opt for a ready-developed system of this kind. Preliminary costings made by the Branch indicated that there would be significant savings.

Home Office O & M Branch were invited to assist by assessing the current position and investigating options for improving the system, and their study concluded that it would be right to opt for a small electronic system. On the basis of a workload of 6,000 payable orders per week, the estimated saving which would be achieved by using such a system would be about £45,000 per year when compared with the existing manual system. O & M Branch supported the proposal that the vote sub-head records should be held on a non-visible record which would replace the ledger cards. The main advantages of using a non-visible record were that vote accounting would be a speedier, more automated process, providing flexibility and scope for the future development of cost data analysis and retrieval.

A small electronic system would be able to do more than store and analyse cost information on the conventional vote sub-head basis. It could be programmed to produce cost data on other breakdowns and, if the need arose to provide more cost information in a variety of different ways, the equipment could be used to produce a more detailed punched tape output which could be fed into a computer located elsewhere. An immediate advantage was that the system for bill paying and vote accounting would be centralized and completely under the control of Accounts Branch. This ought to make for maximum speed in preparing payable orders and schedules (with a considerable reduction in the staff time allocated for checking them) and also in the Branch's general service on this front to payees and the rest of the Home Office.

Implementation

The findings of the study were accepted, and Treasury authority was obtained for expenditure on the purchase of suitable equipment by competitive tender action. O & M and Accounts Branches evaluated the tenders received, discussed with the firms involved and saw a variety of possible machine systems. In April 1972 the contract was placed with Melcom System (UK) Limited. During subsequent months the firm worked directly with Accounts Branch, who consulted as

necessary with the PGO and Exchequer and Audit Department, in order to carry out the systems analysis and programming, preparation of a systems manual and the training of operators. In September, as soon as sufficient equipment had been installed, a seminar was held in Accounts Branch to enable staff to see it, gain some direct knowledge of the systems involved and become familiar with the relationship of the equipment to the running of the Branch and the rest of the Department.

By the end of November the full machine system had been installed and was undertaking the bill paying work, the first of its two functions. During the subsequent two months work continued on the second stage, the vote accounting function. Existing vote and sub-head data as recorded on the ledger cards was transferred to the disc memory of the central processor and, once it was accepting tape input and up-dating the vote information held on the disc memory, the ledger cards were superseded. The next and final stage was to bring into central payment all the bills previously paid locally.

The Melcom system

The original concept had been to produce the payable orders as a separate exercise on equipment distinct from the vote accounting machinery. The preparation of payable orders called for comparatively simple equipment—a keyboard machine with electronic calculation and paper tape punch and controlled by programs—whereas the vote accounting function necessitated using a small computer capable of automatically processing paper tape input, and providing speedy access to the whole of the vote account. Also, separation of the two functions would allow for increasing at minimum cost the machine capacity for preparing payable orders without providing too much machine capacity for the speedier, automated function of vote accounting.

In line with this the contract had provided for three systems typewriters to undertake the payable order preparation and one Melcom 83 Electronic Data Processor for vote accounting. In the event the company were unable to supply the three systems typewriters, and in their place they supplied three more Melcom 83 machines at no extra cost. Although to this extent the new machinery is more elaborate than is necessary it has not affected the cost savings of the system, gives a much greater built-in scope for future development than had been contemplated and, of course, still permits the separation of bill paying from vote accounting.

Accounts Branch make up the invoices and vouchers for payment by underlining the names and addresses and entering on them the code of the appropriate head of charge and a description of the payment. They are then passed in batches to the bill paying machines, under cover of a control document and a machine list. Information for the production of the payable orders is taken by the machine operators direct from the invoices and vouchers. The operator types in the amount of the payment, name and address of payee and a narrative

description of the payment, and enters the head of charge code(s) and the amount to be posted to each code up to a maximum of ten for any single payment, with automatic verification that the sum of the individual chargings equals the amount of the payment. The machine prints the total value on the payable order, dates it, prints on it the next sequential order serial number and calculates the check digit which, although not printed on the order, is punched in the paper tape. At the end of each batch the operator enters the total of the payable order values as shown on the machine list. This total is compared with the machine-accrued total to highlight any discrepancy. At the same time as preparing the orders the machines produce paper tape punched with relevant details to be fed into the central processor to up-date the recorded information. This tape is also used to produce schedules. A further facility provided by these particular machines is the use of edge punched cards. A file of them has been created for payees to whom payments are regularly made so that payable orders can be produced automatically as required in these cases. Depending upon whether the head of charge code and narration is included in the card, the operator only has to enter either the value of the payable order or the value and the head of charge code. The remainder is printed automatically.

The three bill paying machines are capable of producing a total of about 1,100 payable orders in a 6½ hours effective working day subject to the amount of downtime being kept to a minimum and to the effect on output of operator fatigue which has still to be evaluated. More can be produced on the machine used for vote accounting so that the potential effective annual output is probably of the order of the 300,000 which was the target.

When a number of batches of payable orders—which are in continuous stationery form—have been prepared the stationery is changed and the paper tape produced simultaneously with the orders is fed back into the machine (or one of the other bill paying machines) to produce a schedule showing the code of the Department's account with the PGO, date of payment, batch serial number, payable order serial number including check digits, names of payees, amounts of payments, accounting codes and the amounts chargeable to each code. This schedule can be produced in duplicate if necessary to provide a hard copy schedule for the PGO should this be needed as an alternative to the tape referred to later. The schedule effectively replaces the register sheet previously produced by the typists. The punched tape is then available for the next operation on the machine used as the central processor and the payable orders are ready for bursting and trimming prior to despatch.

The central processor consists of an operating console with typewriter and data keyboard, tape punch, tape reader and visual display unit, and a separate magnetic disc memory unit. A magnetic disc in the operating console has a capacity of 12,000 digits or 1,000 words;

these are all used for programming. The separate magnetic disc provides an additional 120,000 digits or 10,000 words, for the file of information for each of 5,000 heads of expenditure, each head requiring two words. When the paper tapes are received from the bill paying machines they are fed into the central processor via its paper tape reader. The appropriate heads of charge are up-dated on the vote sub-head files held on the disc memory. This includes automatic summation to the main vote sub-head totals. During this process, the total value for each batch is accrued as it is processed and this is compared with the total value for the batch as punched to the tape during the production of the payable orders. If there is any discrepancy an error message is printed out.

At the same time as the processing run is undertaken—or separately as required—a paper tape edited to match PGO requirements can be produced for despatch to that office. This tape would replace the typed schedule previously produced on typewriters to enable PGO to verify the amounts of the payable orders when they are presented for payment. It is intended to operate in this way once PGO are satisfied with specimen tapes and orders produced for testing by them. While the tapes in respect of the day's payable orders are being processed a print-out is obtained showing the batch serial numbers which have been processed together with the charging to certain predetermined accounting codes. At the end of the run a grand total of the postings made to each of the six votes currently handled is printed out.

A print-out of the total expenditure to date on the main sub-head and suspense account headings is made daily. Greater detail, for example, breakdown of expenditure within a sub-head, or that incurred at a particular outstation, can be produced as required by running through the appropriate program tape. A complete print-out of the whole of the vote account can be produced as required, and in any format since the processor provides immediate random access to the whole of the vote account information.

Postscript

It is worth mentioning the following in connection with installing a system of this kind. Voltage fluctuations of more than plus or minus 10 volts in the power supply will almost certainly be outside the machine's tolerance; a voltage stabilizer is very often an essential item. The Property Services Agency test the power supply for variations. Other ancillary equipment must be ordered well in advance if they are to be available when required, for example, a trimmer/burster to separate the payable orders and make them of a size acceptable to the PGO computer, an enveloper/sealer, tape winders and splicers, tape bins and supplies of the stationery needed. Adequate ventilation of the machine room is also essential because of the amount of heat generated by this type of machine, and some partitioning and sound-proofing may have to be installed.

What is a Staff Inspector?

W. A. R. WOLFE, Civil Service Department

Walter Wolfe was until earlier this year Head of the CSD Staff Inspection and Evaluation Branch, the function of which is to undertake staff inspection as a part of the manpower control function of the CSD, to assist departmental staff inspectorates to maintain uniform standards of grading and complementing, to propagate up-to-date methods and to train staff inspectors. The SIEB also provides a job evaluation service to the CSD Divisions concerned with matters of pay and grading structure. —*Editor.*

For some civil servants the term 'staff inspector' conjures up the image of a man from 'Establishments', hatchet in his brief-case, seeking spare capacity that he can axe, or work that can be down-graded. If this is your image of a staff inspector it is very much out of date, and the possibility is that you would find it difficult to recognize the person who now undertakes this task.

What is staff inspection in the Civil Service?

Staff inspection is in essence the direct examination of work to see that it needs to be done, that the organizational structure in which it is done is conducive to its most efficient performance and that the staff numbers and gradings in that organizational area are correctly related to the needs of the work.

The first thing to be noticed about this definition is that it refers to work and not to people, so that staff inspection is not an inquisition into the personal merits of those doing the work, into their ability or capacity to do it, or their personal attitude towards it. Staff inspection aims to establish the number and grade of staff needed to do the work effectively, assuming that an acceptable standard of performance is maintained. But the fact must be faced that Parkinsonism—in the organizational sense—is not a wasting disease, and one of the functions of staff inspection is to keep it in check, so there will be many occasions on which the result will be the adjustment of numbers or grading to recognize reduced workloads, the introduction of more effective working methods, or even arrival at a point where new work leaves the development stage and becomes more of a routine process. But an increase in workload can equally be recognized by recommendations for increasing staff, new functions can justify new gradings, and so on—even if a policy of maintaining or reducing the overall numbers of staff in the Civil Service may make it necessary to look for savings in another area to meet the increased demand. The fact that staff inspection finds occasions to reduce staff numbers may be a reflection of the fact that while managers will tend to ask for additional staff, perhaps to meet new

or increasing commitments, there is not always an equal willingness to give up staff when methods are improved or workloads decline.

Why staff inspection?

It may be asked—what are the advantages of staff inspection when so many other management techniques are available and are used to similar ends in the commercial world? The answer to this question stems in large part from the fact that the Civil Service differs in a number of important respects from the commercial companies and organizations for which those other techniques have been evolved. Many of those techniques operate to the best advantage in organizations exhibiting the fundamental common feature of a measurable factor of profitability, towards which the various parts of the organization make their contribution: but this is not an over-riding consideration in much of the Civil Service, which is subject to other constraints of a political and constitutional nature. And the Civil Service, being a 'federal' organization with a high degree of central management and recruitment, and mobility in many grades, must operate with a pattern of nationwide standards, especially for grading, which cannot be changed to meet local circumstances or conditions.

One of the major advantages of staff inspection, as against other more intensive forms of inspection and review, is that it can cover an organizational area in a relatively short time, so that it can respond quickly to existing or new situations.

When is staff inspection carried out?

Staff inspection should ideally be carried out as part of a continuing programme: it was recommended by a Select Committee of the House of Commons, and accepted by the Treasury,* that the aim should be to cover every part of the Service on a three-year cycle. In practice, the demand on staff inspection resources for special purposes is such that a three-year programme is not always possible.

Or an inspection may be requested by the Establishments Branch to provide the factual basis on which changes of complement or of grading levels may be made, perhaps as a result of a change in workload or the introduction of new work. Or, again, a branch, or higher management concerned with that branch, may request an inspection if it feels that it is needed to solve a staffing problem. Inspection can also be proposed by the Civil Service Department and this is often undertaken by CSD inspectors in conjunction with a Department's own staff.

How is staff inspection carried out?

All Departments except the smallest have their own staff inspectors who carry out the bulk of the inspection work. The CSD Staff Inspec-

* Fifth Report from the Select Committee on Estimates 1963–4: Treasury Control of Establishments (Cmnd. 228).

tion and Evaluation Branch carries out joint inspections with departmental inspectors and it may also assist in the inspection of areas containing specialist staff of which the departmental inspectors may have only limited experience within their own field of activity. In the smallest Departments inspection is done by CSD inspectors.

There is no hard and fast routine, applying throughout the Civil Service, for carrying out a staff inspection, but there are a number of general principles that are followed.

No staff inspection can be carried out 'cold'. The first necessity is that the inspector, or the inspection team if it is a large task, should study all the available background material—reports of previous staff inspections or management services assignments; organization charts; descriptive material about the work that will be encountered, and about the functions of the work area; job descriptions; procedural instructions; in fact, anything that will help towards the proper understanding of the work and staffing of that area.

If there are no up-to-date organization charts or job descriptions the staff inspector will probably ask for a chart to be prepared and may ask job holders to complete brief questionnaires which will later form the basis of an interview.

Before these interviews with the staff take place, the inspection programme is discussed with the line managers in the area to be inspected, who are invited to give their view of the general staffing situation, of particular problems including any that may have given rise to the inspection, and on the proposed programme. At this stage too, it is usually the practice to offer an opportunity for Staff Side representatives, who are frequently advised of the staff inspection programme, to put forward to the inspector any comments they may wish to make.

The next stage in a staff inspection is the interviewing of the job holders. In some cases it will be necessary for every member of the staff of a section or branch to be interviewed, but where there are a number of similar posts it is often possible to select a representative sample of posts for inspection to give a comprehensive picture from which conclusions may be drawn in respect of that particular work area. There is no preconceived order of precedence for interviewing; frequently it is convenient to begin at the lower levels and follow the work-flow upwards, but this may not always be the best method of approach. In any case, those well-known 'exigencies of the Service', including duty or leave rosters affecting the actual availability of people, might throw a tightly drawn programme out of gear, and make 'out of sequence' interviewing unavoidable. At this stage, it is essential that the staff inspector should get as thorough an appreciation as possible of the work of each post inspected, its nature, its objectives, its volume and its demands. Each level in the organizational structure is inspected so as to set each post in the context of the whole branch or unit being inspected, as well as to confirm the information already obtained and to

clarify any matters that may not be fully apparent to the job holders.

Finally, when he has completed his interviews, digested the information he has obtained and has begun to formulate ideas as to his probable conclusions, the inspector will usually see the line manager at an informal meeting at which the inspector outlines his provisional conclusions, and seeks a discussion of them. This interview will also show up any need for further information to be obtained by visits or documentation.

How does the staff inspector reach his conclusions?

Having looked at the needs for the work and the methods by which it is carried out, the inspector's conclusions will fall under two heads—the number and the grading of the posts needed to carry out effectively the work that is required to be done.

The staff inspector should be a trained and experienced officer. He is trained in the appreciation of many up-to-date management techniques, in the assessment of workloads and particularly in the application of Civil Service grading standards. He should therefore bring a considerable amount of knowledge and skill in these techniques to the problems before him. Posts in the Civil Service are allocated to grades within classes or groups at a level appropriate to the nature of the task involved, there being accepted standards for each of these levels, developed by experience into the 'case law' of grading. It is the staff inspector's task to use his training and acquired techniques to apply these standards to the task in hand.

In all this, the staff inspector does not apply proprietary techniques of work measurement or numerical job evaluation. But in order to assess a complement he will need amongst other things to establish the current and projected workload; calculate the time needed to perform various tasks, and their frequency; and appraise the level of output in relation to accepted standards. In assessing grading levels he will take account of the knowledge and skills that must be brought to the job, of the decisions that need to be made, of the complexity of the task, limitations imposed by regulations, procedures and supervision, and management responsibility. These may be familiar to some as 'factor' headings in numerical or quantified job evaluation, and although the staff inspector's assessments are not quantified in this way, they are arrived at by analytical processes which aim to achieve a consistency of approach in reading.

There may be occasions on which the necessary adjustment of staff numbers and grading will mean that some organizational change has to be recommended; if this is of a straightforward nature, he will make proposals and discuss them with the line management. But if they are more complex, or possibly raise specialized problems that may require the application of more sophisticated management techniques, he may recommend that these be looked at in greater detail by a management services specialist.

The staff inspector or inspection team's conclusions and recom-

mendations are normally embodied in a report to the Principal Establishment Officer, on which subsequent action can be taken.

It might be appropriate to mention at this point that staff inspection is generally regarded as an instrument of manpower control to enable management to use its resources of manpower to the best effect. Yet it is clearly desirable that the process should be fully understood by the staff concerned and, as mentioned earlier, to this end the staff associations and trade unions representing those staff are generally advised in advance of the inspection and given opportunity to put forward any views to the inspectors. Whether the full report of the inspection can be made available to the staff interests is left to management to decide, but it is clearly desirable that any significant changes proposed by management as a result of the inspection should be fully explained to them.

So, what is a staff inspector?

From this brief description of staff inspection as it is carried out in the Civil Service, it emerges that a staff inspector, not always from the administration group but possibly a member of a different Civil Service category, should be experienced and trained in complementing and grading work. He should have an appreciation of a number of management techniques including job evaluation and will have a working knowledge of the principles of a range of other techniques. Above all, he will be a skilled and sympathetic interviewer, without bias in favour of management or staff interests, whose aim should be to establish the facts and, on the basis of those facts, to assess the complement and grading of staff required for the effective conduct of the work.

Compare and Contrast O and M and MbO

D. D. WELLMAN, Civil Service College

Defining terms is not easy. Definitions abound and personal preference has a part to play. O and M is generally accepted to be the systematic study of the structure of an organization, its management, control, procedures and methods undertaken to increase its efficiency. It might be claimed that this could serve also as a definition for MbO, but the general view is that MbO is a term used to describe a system of management. Several books have been written on the subject and different authors place differing degrees of emphasis upon aspects of management which are included within this concept. An MbO system advocates clarification at each level of management of what is required—this is agreed between a manager and his superior—and regular review of what has been achieved. It is intended to be a comprehensive system going well beyond a set of rules or a series of procedures or even a set method of managing. It has been described as a particular way of thinking about management. We may each have a picture in the mind's eye, differing widely according to experience, of what may have taken place under respective banners of these two distinct sets of initials. It may be more advantageous to concentrate on the concepts rather than the practice.

To the examinee, required to produce an answer to the (hypothetical) examination question, a number of further questions arise. Are the two both species of the same genus, Management Services? Or does one in fact embrace within it all the essentials of the other? If not, what is the degree of overlap, can the essential difference between them be identified? Or are we really not comparing like with like? Though both are aids to management, are the approaches so different that comparison would be futile? These are some of the questions on which one hopes a little light may be shed.

Some people believe that O and M falls within the 'limited success class'. They claim that it has achieved some of its objectives moderately well, but it has failed to make sufficient progress in convincing management of the need to employ more modern management techniques. There is some truth in this charge and many of us are familiar with the alleged failings of O and M. In recent times there has undoubtedly been a strengthening of the O and M effort within the public service, but the fact remains that its success rate is not as high as the hopes it arouses. Whether the shortcomings in achievement are inherent in the very nature of O and M or whether they are a result of it being less well done

than it might be is a crucial question. Assuming that there were no imperfections in the way O and M was carried out, would it necessarily secure on every occasion the results it is trying to achieve? The answer is likely to be in the negative because of the natural and understandable resistance to change that exists at all levels. This is coupled with a reticence in some quarters not to grasp prickly nettles before this becomes imperative. This does not merely apply to operational line management: it can apply equally to the management of management services or training units or other advisory services.

What motivates change is normally a feeling on the part of management that things could, should and must be done more effectively, coupled with a general consensus as to the direction such improvements should take. As a catalyst or change agent O and M has certain handicaps, not least being that its presence within a unit is too often regarded as an imposition. However kindly disposed towards his fellow men the O and M representative may be, for many he will always wear horns and a tail simply because by definition he is an outsider. If good results from his presence he is unlikely to get the credit in the eyes of the staff: if evil, although the management may carry the can, the O and M practitioner will be given the odium. O and M, being easy to knock, has a constant fight to maintain its image and tarnishing agents are everywhere at hand.

MbO is also in this business of change. It is concerned with raising the effectiveness of organizations both by changing the structures and the systems and by changes in managerial and, consequently, staff behaviour. It does this by obtaining a clarification of responsibilities and looking at jobs in specific output terms (i.e. what are we trying to achieve rather than what jobs need to be done). This will often lead to some modification to the organization structure and to the pattern of communications. It will encourage the development of planning procedures including the agreement of objectives for both units and individuals and will require appropriate measurement and control data to be provided in order to assess performance against the stated objectives.

Managers often see the introduction of MbO as a threat to their own system of operating or to established ways and means of working. This is certainly predictable. Nobody relishes being told, even as delicately as may be, that his breath is impure. Insufficient willingness to delegate, communicate, trust or plan is, after all, a basic weakness that most of us share. It is quite a common failing to treat one's subordinates in such a way that they are not given sufficient opportunity to use their initiative, develop their talents and 'grow'. But just as most people have a pretty fair regard of their own ability to drive cars, to be a sympathetic listener, and to be good at getting things organized, so none of us is prepared to concede that our own capacity to manage is infinitely poorer than we might wish.

Yet of all the personal skills it probably requires more self-awareness

and understanding than most. There are the very few 'naturals'—totally untrained practitioners of management. Most people pick it up as they go along, which is another way of saying they learn through their mistakes, much to the discomfiture of their subordinates. It could be argued that it is less difficult to carry out many of the highly professional and technical tasks that we have in the Service than it is to exercise first-rate skill and first-class judgment in management. The latter is concerned primarily with people, and people are less predictable than inanimate objects or concepts.

It is not a coincidence that less than a third of Harvard graduates show interest in first line management jobs. They far prefer to start their careers in staff or specialized positions farther from the heat of battle where they are less exposed should they err. They prefer (don't we all?) the more detached role of a consultant or an adviser. Civil servants, sometimes rather introverted and occasionally withdrawn characters, often shy away (*le mot juste*) from too much exposure to what is interpersonal relationships. Management is communication: skill as a communicator determines success as a manager. And communication is infinitely more difficult than we are apt to think. A main source of mischief identified by O and M is the lack of a firm will to manage and the capability to manage effectively. And this reluctance may have stemmed from being exposed in the past to a failure to communicate.

Consultants have said that their most important work is the process of educating management. In the Service this process is often left to the training branch rather than the agency of an O and M assignment officer. The latter may in terms of grade be inferior to the management he is endeavouring to educate. He may find that there is no palatable way by which he can both identify the need for better management and ensure that thereafter firm action will be taken to improve management performance.

MbO can do nothing to solve this problem automatically. There is no point in accepting MbO unless there is not merely a wish but a will to manage better. There are certain mechanistic trappings which can be gone through including a sophisticated form of paper chase culminating with a target setting exercise. This is not MbO though occasionally it masquerades as such. Management systems cannot work effectively without the co-operation of the people in the management process and MbO properly applied makes this participation a *sine qua non.*

How then does this affect the need for O and M? One is inclined to think that the more management consciousness there is and the more will to manage is demonstrated, the greater will be the realization that management services has something of value to offer. There will be many aspects of work where the manager will need expert, objective advice from people with ability, experience and training and with the time to devote to looking at various possible solutions.

It may be objected that some of these observations are fairly theoretical

and remote from what sometimes happens when either O and M or MbO come knocking at the door. But just as would-be Christians are not always the best advertisement for Christianity or Communists for Communism, the manifestations of O and M and MbO do not always do justice to the concept. That is not a valid argument for declaring the concept impracticable or unworkable. There is sufficient evidence published elsewhere to demonstrate that both of them have a valuable place in assisting operational managers and those in 'staff' roles with their vexed problems. The better view is that these two sets of initials are complementary, each in its different way making a valuable contribution in helping to change the style of management within the Service to meet the enormous demands not only of the '70s but beyond.

Planning for Telephone Coverage

J. M. STUART, Inland Revenue Telecommunications Unit

Possibly no other service is so underestimated, unappreciated and misunderstood as the telephone service. It is regarded as an intrusion when it has to be answered yet it must always be available for us to intrude on others. It can be a costly luxury or a cheap alternative to written communication. The cost of telephones can be regarded as an unavoidable business expense or a profitable integrant of an organization. Its service efficiency can be constantly monitored or action can be deferred until a bottleneck or breakdown occurs. The following simple case history may be of interest as an example of the pitfalls likely to be met in telephone planning for a new situation and as a guide to some of the types of Post Office equipment which can be used to overcome specific problems of call distribution.

When our computerized PAYE Centre in East Kilbride, Scotland, was designed it was necessary for us to make assumptions as to the size of the PABX needed based upon our own experience of telephone traffic in conventional Tax Offices and the knowledge of the Post Office planners of exchange systems. Since this was our first excursion into mechanization of PAYE no direct comparisons were available as to likely traffic figures and we had no reason to suspect that call duration would differ widely from national averages. A four-position PABX 3 equipped with 40 both-way plus 27 outgoing-only exchange lines and 700 extensions was subsequently ordered and brought into service when the Centre opened in the autumn of 1968.

Very soon after commissioning complaints were received that calls from members of the public could not get through to the Centre. The

number of lost calls was very high and urgent action was needed to restore a good service to telephone callers. There was strong evidence that by mid-1969 the East Kilbride public exchange was being overloaded because of the bottleneck caused by the inadequacy of the Centre 1 exchange. Because of the lead time of at least 18 months for automatic telephone equipment we turned to manual exchanges as a short-term measure to supplement the PABX 3. A PMBX with 20 both-way exchange lines and 100 extensions provided immediate relief whilst a thorough investigation into the reasons for the bottleneck was undertaken.

Our first step was to ask the Post Office to ascertain the average duration of calls into the Centre. This we found to be 7·3 minutes and comparison with Post Office figures revealed that this was more than double the national average. Obviously occupancy of exchange line connecting circuits for long duration on an exchange likely to receive up to 800 calls in the busy hour very quickly produces a saturation condition and seemed to indicate that, at the very least, we would need to double the size of the PBX without delay.

In early 1970 the small supplementary PMBX was replaced by a six-position PMBX with 40 additional both-way exchange lines and 400 extensions and the exchange line coverage was arranged so that a reasonably even distribution of calls between the two exchanges took place. The extensions from the manual exchange were terminated on red telephone instruments so that they could be identified and no outgoing calls were permitted from them. Tie lines between the two exchanges were installed to ensure that calls arriving on the one, intended for extensions served only by the other, could be re-routed. The arrangement was designed on a purely temporary basis until permanent additional PABX equipment could be obtained. The Post Office provided and installed the new PMBX switchboards and all the associated extension wiring throughout the building in just over three months which, considering the size and complexity of the work involved, was a remarkable effort.

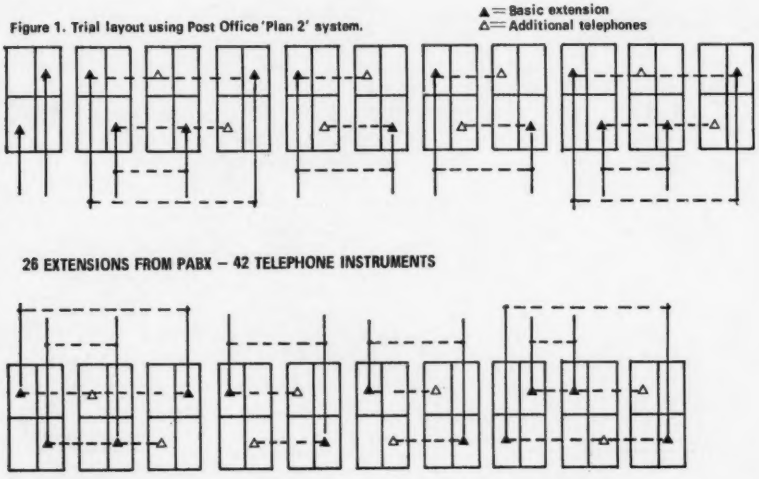
Traffic checks made when the hybrid arrangement was fully operational indicated that lost calls had been reduced to a very low level and that it was safe to undertake the preparation of full Post Office traffic data for use in designing the eventual PABX. This data suggested that a 10-position PABX 3 with a total of 165 exchange lines and 850 extensions at the two-year date would contain our telephone traffic. An order was placed in June 1971 and after installation and commissioning in April 1972 this exchange is now working satisfactorily and service to the public is good.

It is worth mentioning that bottlenecks caused by equipment and exchange line deficiencies have the effect of increasing the load on the switchboard operating staff, who can be faced with long periods of operation without respite. Under these circumstances it is essential to provide breathing space and relief if an efficient service is to be maintained.

The action taken, however, represented only a partial solution to our problems. Obviously incoming exchange line busy hour call loads of 800 per hour require swift handling by the operators and it is vital that they should be able to dispose of these calls to extensions with the absolute minimum of delay. The absence of alternatives if an extension is engaged or fails to answer quickly results in decreasing efficiency. Our investigation therefore included the distribution of calls to the larger work units of the Centre.

There are 17 storeys in the tower block, 16 of which, apart from managerial staff, etc. house approximately 64 tables arranged in groups down the length of the floor. Original coverage was one telephone extension per group of four tables, installed on a swivel arm so as to be available to all four occupants. To this basic layout supplementary instruments had been added at strategic places. We were unhappy about this layout which was proving to be too rigid. The managers of the Units on each floor required a flexible system to enable seating arrangements to be made according to the distribution of work. No two floors of the tower block were precisely similar in layout and a single floor could change in layout as work requirements changed. We therefore designed a system based upon the Post Office 'Plan 2' arrangement (enabling up to six people to share the use of two extensions) which appeared to give the required flexibility without increasing the number of extensions per floor. To test the system we installed it on one floor and asked our switchboard operators to log the number of incoming calls to the extensions and the number of times they were unable to make a connection at the first attempt. The layout is shown in *Figure 1*.

Figure 1. Trial layout using Post Office 'Plan 2' system.



It uses 26 extensions from the PABX and 42 telephone instruments. At the desks of group supervisors a single telephone extension was provided and throughout the remainder each telephone instrument had access to two extensions via the 'Plan 2' system.

Our expectation was that a fairly even distribution of calls would take place and that there would always be reasonable alternative answering positions available to ease the load on the operators at peak periods. Unexpectedly we found that 96·4 per cent of all the incoming calls from the switchboard were being routed to 13 of the 26 extensions. The remaining 3·6 per cent were distributed amongst nine other extensions and four extensions did not receive any calls at all during the trial period. We took no account of outgoing or extension to extension traffic during the trial because our intention was always to provide full extension coverage to all persons. It was flexibility to contain uneven call distribution we were seeking.

Figure 2 provides a graphical representation of the distribution of the incoming traffic included in the census. It will be seen that for some groups a very high proportion of the calls were engaged at the first attempt by the operators to make connection. Additional outlets had to be provided at these points in such a way that their effectiveness could be transferred from group to group as the work changed, but without exceeding the limit of 26 extensions which was governed by the size of the PABX equipment.

Figure 2. Results from trial census. Figures in parenthesis are number of calls which could not be connected at operator's first attempt.

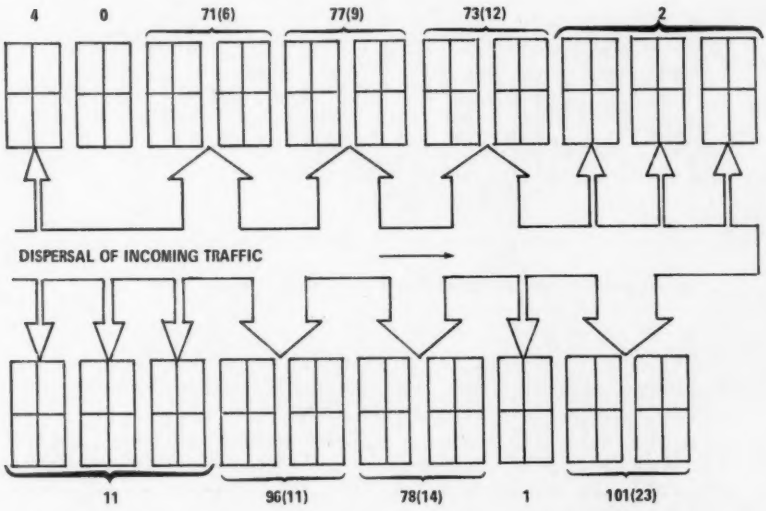


Figure 3. Revised 'Plan 2' layout plus use of 'Plan 4' arrangement to provide additional outlet points at most needed places according to work requirement.

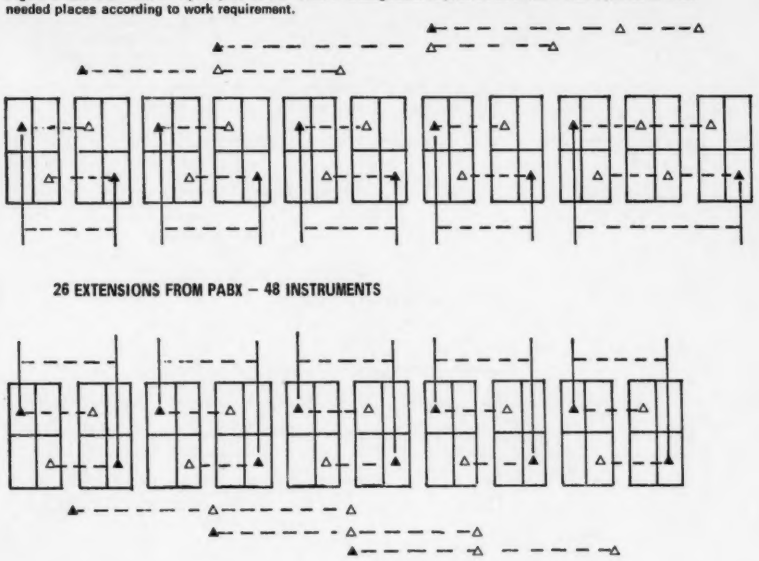


Figure 3 shows a further layout using 'Plan 2' but this time incorporating 'Plan 4' sockets. The Post Office 'Plan 4' arrangement enables a telephone to be plugged in to any one of several sockets connected to an extension. The layout provided for three extensions at each side of the room to be provided in 'Plan 4', each extension having three outlets sited strategically down the room. The idea was that telephone instruments could be plugged into the socket most appropriate to the overloaded group and the switchboard operators informed for directory purposes. The application of this system to the particular traffic situation revealed by the census is shown in *Figure 4* overleaf.

This system has proved in trials to be both efficient and popular with users. Staff working within the groups are able to answer calls intended for absent colleagues without leaving their desks. Managers find the flexibility provided by the 'Plan 4' sockets of value in arranging their seating plans according to workloads. No additional PABX equipment has been required.

The Post Office are at present installing this layout throughout the remaining floors at East Kilbride and we feel the results fully justify the considerable amount of work involved. The general principle is being kept in mind for any other large office building we may be called upon to plan for telephone coverage.

The system obviously applies in our case to specific situations within

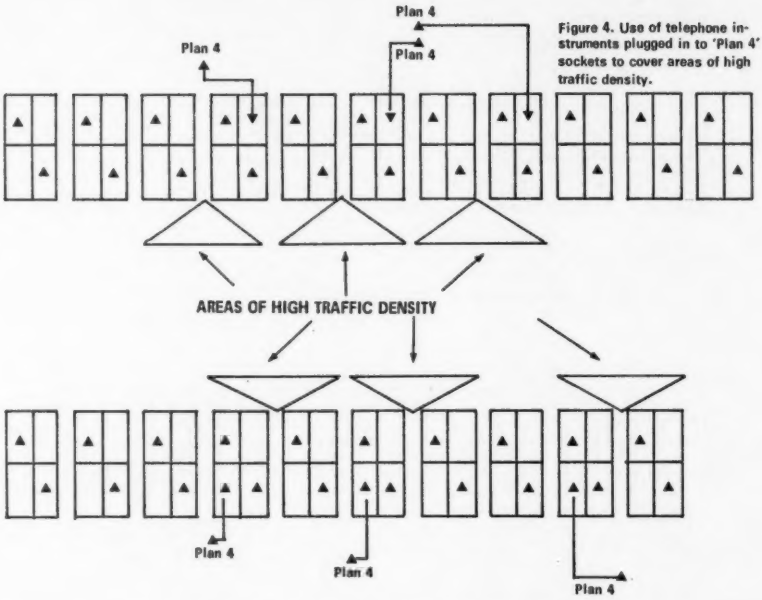


Figure 4. Use of telephone instruments plugged in to 'Plan 4' sockets to cover areas of high traffic density.

our own organization. The general use of Post Office 'Plan' arrangements to improve telephone coverage economically may, however, be worth bearing in mind in any situation. It is not always right to assume that increases in the number of extensions provided necessarily improve the efficiency of the system nor that 'one for one' provision is the best that can be achieved.

New Office Equipment

This section contains a description of new items of office machinery and equipment. Inclusion of any particular item is not to be regarded as an official recommendation nor as indicating that it will necessarily be available to Government Departments.

PITNEY-BOWES MODEL 1192 LETTER OPENER

Marketed by Pitney-Bowes Limited,
The Pinnacles, Harlow, Essex

The semi-automatic, electrically operated Model 1192, an illustration

of which appears opposite page 145, is said to be able to open any envelope up to $\frac{1}{2}$ in. thick and 12 in. in length, and to be powerful enough to cut through all grades of envelope stock including heavy brown Kraft, while trimming off thread-like edges to avoid damage to contents. It has a removable tray to take the trimmings, and a window in the base of the machine allows the operator to see when the tray needs emptying. Constructed to be completely safe to use, the Model 1192 comes in impact resistant aluminium alloy with a cutting blade and shear plate of precision ground hardened steel. It stands on skid-proof rubber mounted feet to avoid scratching of desk tops.

Further information may be obtained from the company.

STROMBERG MODEL 250 DATE AND TIME STAMP RECORDER

Marketed by Broughton and Company (Bristol) Limited,
6 Priory Road, Clifton, Bristol BS8 1TZ

The Stromberg 250 date and time recorder, which is illustrated opposite page 145, will automatically print the date (day, month, year), the time (24-hour digital clock) and a name or department number when a card or paper is inserted. The machine is said to have a life-time self-lubricating motor and to be extremely quiet in operation. It has a no-smudge cartridge self-replacement ribbon and a visual 24–hour digital clock and date. The recorder is designed for wall mounting or for desk-top use with dimensions of $3\frac{1}{2}$ in. $\times$ $5\frac{3}{4}$ in. $\times$ $8\frac{1}{2}$ in. Weight is 8 lb.

Further information may be obtained from the company.

ANITA 811 POCKET CALCULATOR

Marketed by Sumlock Comptometer Limited,
Anita House, Rockingham Road, Uxbridge, Middlesex

The Anita 811 pocket calculator, which is illustrated opposite page 145, is powered by dry cell or rechargeable batteries. The capacity of the machine is eight digits. It has an accumulating memory, percentage key, round up and floating decimal point, and provides the four arithmetic functions combined with chain calculations.

Dimensions of the 811 are $2\frac{3}{4}$ in. $\times$ $4\frac{3}{4}$ in. $\times$ $\frac{15}{16}$ in. Weight is 6 oz. An adaptor for mains operation or to recharge chargeable batteries is available as an optional extra. *List price* £75

SPEEDFLEX VISIBLE INDEX CABINET

Marketed by Kalamazoo Limited,
Northfield, Birmingham 31

Speedflex, an illustration of which appears at the centre pages, is a mobile visible index cabinet mounted on castors that stores loose

cards in horizontal steps so that a clear visible edge is maintained.

Features offered by Speedflex are: cards may be speedily located and selected; cards are removable for other operations in the same or other locations, e.g. posting by hand, typewriter or machine accounting; cards are slotted back in position after use; cards can be added, removed or rearranged; missing or active cards are signalled by special card design; ancillary documents can be housed with the main record; and a large number of records can be housed in a small manageable area.

The body is moulded in polyurethane foam, has chrome side rails and, perhaps the most attractive feature, a roller top that closes the unit and keeps the contents secure and private. Toe brakes secure the unit at a work station.

Two sizes of Speedflex are available and both are made to hold cards of either 150 mm. or 210 mm. in height. The maximum working capacity is 5,000 cards, depending on the width of the cards.

Further information may be obtained from the company.

3M MODEL 600 READER/PRINTER

Marketed by 3M United Kingdom Limited,
3M House, Wigmore Street, London W1A 1ET

The '600' accepts 16 mm. roll film fed from either 3M leaderless 'Easy Load' or standard 3M cartridges. In each case film is self-threading. The equipment has a variable speed motorized film drive. Standard and thin based film may be used. The 14 in. × 18 in. screen provides dual image display; for example, two A4-size documents side-by-side. Full viewing of COM generated images is possible, coupled with the ability to project drawings and diagrams at full or near full size.

Variable magnifications are achieved using banks of lenses housed in a rotating turret. The equipment embodies the familiar 3M odometer as an indexing and retrieval aid. Image rotation is a standard feature. The print process is the now well-established 3M dry silver method—no liquids or powders required. Single print cycle time is eight seconds. An attractive feature is the ability to select variable length prints from 6 in. to 18 in. Paper is supplied in 500 ft. rolls in 8½ in. or 11 in. widths.

Dimensions of the '600', which is illustrated at the centre pages, are: height 31 in.; depth 31 in.; and width 26 in. Weight is 190 lb. Lens magnifications are: Group I—15, 19, 23 and 25×; and Group II—31, 35, 40 and 47×.

List price £1,800

DEK MICROFICHE DUPLICATOR (EXPOSURE UNIT)

Marketed by Scottish Instruments Limited,
Merit House, Edgware Road, Colindale, London NW9

The unit, which is illustrated at the centre pages, is of robust sheet steel construction, incorporating a 125W mercury vapour, ultra-violet light

source suitable for use with both diazo and vesicular materials. Contact between master and duplicate is achieved by pressure alone—no vacuum pump is necessary—using a hinged glass plate which clips onto a foam plastic pressure pad. Registration of master and duplicate is simplified by use of corner locating posts, positioned alongside the pressure pad, which telescope away when the contact frame is clipped down.

The contact frame will accept a standard 105 mm × 148 mm microfiche and 6 in. × 4 in. jacket. The frame is an interchangeable 'drop in' unit, and throughput can be speeded up by using additional units—one frame being loaded while the first is exposing. Contact frames can be purchased independently of the main unit. A 'throw out' tray houses the contact frame. The tray is mounted on runners and is pushed into the unit bringing the frame under the lamp. The tray automatically latches in and activates the pre-set automatic timer. At the end of the exposure time the tray is 'thrown out' allowing access to the contact frame. The time switch returns to its pre-set position. Exposure times, for diazo duplicating from master film to standard 0·9–1·2 background density, are 25–30 seconds. Throughout times for vesicular materials are about the same when the necessary additional 'clearing' exposure is taken into account.

Dimensions of the unit, which only performs the exposure function, are: height 27½ in.; width 13 in.; and depth 15 in. *List price* £309

3M MODEL 169 MICRO-JACKET FILLER

Marketed by 3M United Kingdom Limited,
3M House, Wigmore Street, London W1A 1ET

The '169', which is illustrated at the centre pages, provides for the creation of unitized microforms from roll film. 16 mm roll film is fed by manual drive via an optical system, which displays the images on a screen, to a platform on which is placed a standard 6 in. × 4 in. five-channel, transparent film jacket. The film is then fed into each jacket channel in turn. The platform is moved manually, but its mechanism is calibrated to 'lock in' automatically giving precise alignment with successive jacket rows. As each channel is filled up the last image is 'lined up' on the screen and a simple level mechanism operates a guillotine.

A unique feature is the facility for inserting 'short' rows to the far end of a channel to effect correct registration of the full record.

List price £295

DIEHL AUTOTEXT

Marketed by Calculating Systems Limited,
Pyramid House, 956 High Road, Finchley, London N12 9RX

The Diehl Autotext automatic typewriting system, which is illustrated

at the centre pages, incorporates a cassette storage capacity of 25,000 characters, equivalent to ten full pages of type. Comprising basically a heavy-duty 'golf ball' electric typewriter and a self-contained desk top control unit, the Autotext operates as an editor for all bulk typing applications. It allows the typist to record her typing on re-usable magnetic tape which, by reason of its cassette form, can be clearly labelled and filed. Copies of the original texts can be produced simply by re-insertion of the cassette.

After the first draft of any script has been typed, recorded onto the cassette and returned to the originator for approval, the features of the Autotext enable the typist to incorporate any deletions, corrections and additions to the original text. It has two magnetic tape units, so that the correct parts of the text are transferred to the second cassette, with changes typed in as and when necessary, using the conditional keys—character, word, line, sentence, paragraph. These keys used in conjunction with playback enable the text to be typed word by word or line by line. Unwanted material can be omitted by using the 'Skip' key, together with the conditional keys. New margins can be reset by using the 'Margin Control' key, by which the text is re-formatted to the margins required. Spelling, grammar and punctuation errors are corrected by the typist who backspaces and types over the incorrect word or character. When the text has been finalized, top copies can be obtained at a rate, it is claimed, of over 900 characters per minute by simply replaying the cassette.

Further information may be obtained from the company.

Book News

PROFESSIONAL MANAGEMENT—New Concepts and Proven Practices

By Louis A. Allen. *Published by McGraw-Hill Book Company (UK) Limited, price* £3·60.

This book covers the main aspects of the manager's task. Although written for the industrial and commercial manager, Civil Service readers should not be put off for this reason. The principles and practices discussed are all equally applicable to the public sector and the absence of the profit motive does not detract from the book's value.

The material is presented in a logical and systematic manner. The total management task of planning, organizing, leading and controlling is broken down into a series of sub-activities, each of which is discussed in detail. The style of writing is concise and Mr. Allen makes his points with great clarity. In many cases, these points are illustrated with examples from the author's experience as a manager and consultant.

It is, perhaps, a small criticism of the book that some of these examples lack sophistication and in one or two cases even detract from the impact of the author's own argument.

It is very refreshing to read a book on management, which, while containing its share of philosophy, also offers specific guidance to managers on how to manage. Two chapters strike the reviewer as being of particular value. There is a great deal of loose talk about delegation —and it is easier to talk about it than to accomplish it. Mr. Allen faces the problem squarely and analyses the reasons why the average manager finds delegation so hard: 'When we delegate, we must share part of our territory and this often runs counter to both our territorial and acquisitive urges.

'Delegation often breaks down for failure to define responsibility and authority. If a manager does not know what work he is to perform, if he does not understand what authority he has, then he will be unable to delegate.' This almost self-evident truth is often overlooked. The various types of responsibility and authority are analysed and the 'organalysis' technique introduced. This technique is similar to the manager's matrix or results influence chart used in MbO and 'is a method for determining what ideal delegation should be, comparing this with the delegation that has actually taken place, identifying and evaluating the deficiencies, and planning the steps necessary to improve'.

The chapter on 'Motivating for Results' discusses the work carried out by behavioural scientists in recent years and comes to several main conclusions. Firstly, there is no scientific evidence that an ideal leadership style exists. Secondly, although people who have satisfying work and good relations with their colleagues will tend to be happier, a direct relationship between satisfaction and productivity cannot be proved. Nevertheless, profitability is most likely to be achieved if people produce because they want to and not because they are driven to it. A manager must be able to assess the differing motivational needs of people and vary his approach to suit the needs of both the people and the situation. This may involve a mix of authoritarianism and participation, and organization control and self-control.

Thus neatly holding the ring between the disputing behaviouralists, Mr. Allen proceeds to give practical guidance on achieving satisfactory participation, and points out the dangers of raising subordinates' expectations to a point which cannot be satisfied. Participation must not become abdication by the manager, who must reserve the right to make the final decision.

This book can be thoroughly recommended both to the student who wonders what the management game is all about and also to the experienced manager who wishes to refresh his memory or to pick up a few additional wrinkles. In particular, it provides a framework (or taxonomy) which the manager can use to monitor and control his own activities.

K. L. B.

Computer Installations for Government Departments

A list of all Government computers as at 1st January 1973 was published as a supplement to the May 1973 edition of MANAGEMENT SERVICES IN GOVERNMENT. Details of computers ordered during the period January to March 1973 are shown in the following table.

DATE OF ORDER	DEPARTMENT[1]	LOCATION	MAIN USES	MANUFACTURER[2] AND TYPE OF COMPUTER
1B Computers on order for administrative and general purposes				
January 1973	Cabinet Office/HM Treasury	London	Econometric modelling	Univac 1106
March 1973	GRO (Scotland)	Edinburgh	Population statistics	ICL 1902A
2B Computers on order for scientific and technical purposes				
January 1973	DTI	Teddington	Scientific research	Honeywell DDP 516
February 1973	MOD (Army)	Chertsey	Vehicle research	ICL 1903A
March 1973	DTI	Teddington	Experimental research information service	CT Modular 1
March 1973	DOE	Borehamwood	Fire statistics; scientific calculations	ICL 1902A

[1] Department Key (*Column* 2)

DOE	Department of the Environment
DTI	Department of Trade and Industry
GRO (Scotland)	General Register Office (Scotland)
MOD (Army)	Ministry of Defence (Army)

[2] Manufacturer Key (*Column* 5)

CT	Computer Technology Limited
Honeywell	Honeywell Information Systems Limited
ICL	International Computers Limited
Univac	Sperry Rand Limited (Univac Division)

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